EXHIBIT 27

STATE OF CALIFORNIA — DEPARTMENT OF CORRECTIONS AND REHABILITATION GAVIN NEWSOM, GOVERNOR

OFFICE OF THE SECRETARY
PO Box 942883
Sacramento, CA 94283-0001

August 1, 2022

State of California
Water Resources Control Board
Central Valley Regional Water Quality Control Board
Sacramento Office
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Attn: Elizabeth Lee
Senior Water Resources Control Engineer

Title and Date of Report	2nd Quarter August 1, 2022
Contact	Elizabeth Lee (916) 464-4786
Regulatory Program	Municipal Storm Water
Order	13383
Regulated Party Name (Discharger)	CA Dept of Corrections & Rehabilitation
Facility Name	CDCR - Mule Creek State Prison WWTP
County	Amador
WDID	5S03M2000307

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of the those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Anthony Orta
Correctional Plant Manager
Mule Creek State Prison

Phone: (530) 221-5424 **Email:** info@shn-engr.com **Web:** shn-engr.com
350 Hartnell Avenue, Suite B, Redding, CA 96002-1875

Reference: 516025.100

July 26, 2022

Elizabeth Lee
11020 Sun Center Drive #200
Rancho Cordova, CA 95670

Submitted to SMARTS

Subject: Second Quarter 2022 Monitoring Report, Mule Creek State Prison, Amador County, California; Order 13383

Dear Elizabeth Lee:

SHN is submitting this second quarter 2022 monitoring report for the Mule Creek State Prison (MCSP), in general accordance with the December 22, 2020, Central Valley Regional Water Quality Control Board 13383 Order (revised). Reports will be submitted quarterly, approximately one month after the end of each reporting period. SHN prepared this report on behalf of the California Department of Corrections and Rehabilitation.

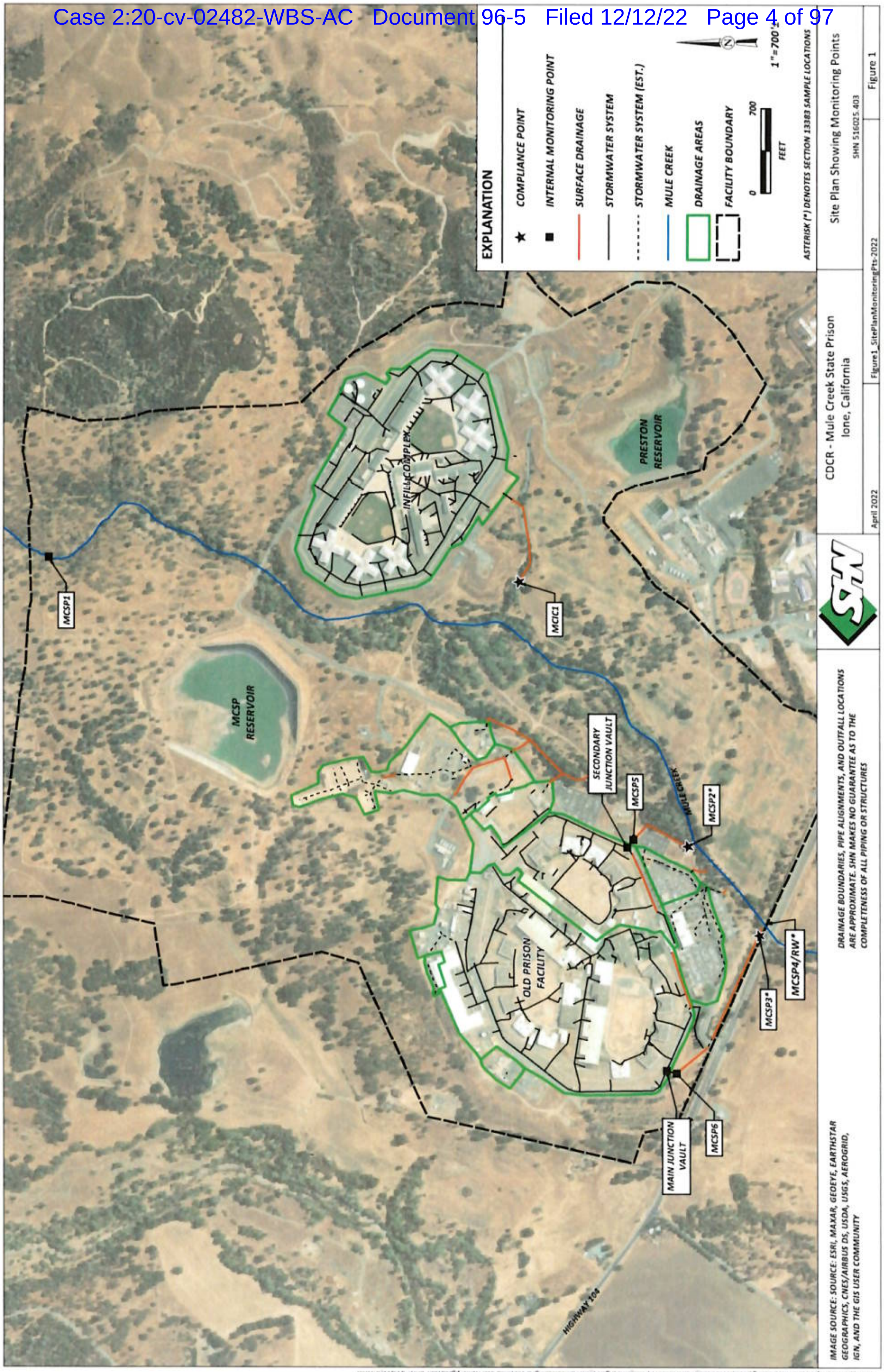
1.0 Volume Diverted to Wastewater Treatment Plant

Currently, four pumps divert water from the stormwater collection system to the Mule Creek State Prison wastewater treatment plant (WWTP). Pumps #2 and #3 are located within the Secondary Junction Vault, and Pumps #5 and #6 are located within the Main Junction Vault. These four pumps have totalizers that show the number of gallons pumped. Pump totalizer readings are recorded daily by WWTP staff. For the second quarter 2022, the total volume of water from the stormwater collection system diverted to the WWTP was approximately 514,800 gallons. Table 1 summarizes the quarterly totals. Daily totals are presented in Appendix 1, Table 1-1.

**Table 1. Junction Vault Pumps, Second Quarter 2022
Mule Creek State Prison, Amador County, California
(in gallons)**

Month	Main Junction Vault		Secondary Junction Vault		Total Gallons
	Pump #5	Pump #6	Pump #2	Pump #3	
April	116,112	117,658	112,713	75,171	**421,654**
May	5,396	50,389	5,400	2,328	**63,513**
June	2,133	27,193	306	1	**29,633**
Quarterly Totals	**123,641**	**195,240**	**118,419**	**77,500**	**514,800**

See Figure 1 for junction vault locations.


EXPLANATION
COMPLIANCE POINT
INTERNAL MONITORING POINT
SURFACE DRAINAGE
STORMWATER SYSTEM
STORMWATER SYSTEM (EST.)
MULE CREEK
DRAINAGE AREAS
FACILITY BOUNDARY
0
700
FEET
1"=700'±
ASTERISK (*) DENOTES SECTION 13383 SAMPLE LOCATIONS
CDCR - Mule Creek State Prison
Ione, California
Site Plan Showing Monitoring Points
SHN 516025.403
April 2022
Figure1_SitePlanMonitoringPts-2022
Figure 1
SHN
DRAINAGE BOUNDARIES, PIPE ALIGNMENTS, AND OUTFALL LOCATIONS ARE APPROXIMATE. SHN MAKES NO GUARANTEE AS TO THE COMPLETENESS OF ALL PIPING OR STRUCTURES
IMAGE SOURCE: SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
PRESTON RESERVOIR
INFILL COMPLEX
MCIC1
MCSP1
MCSP RESERVOIR
SECONDARY JUNCTION VAULT
MCSP5
MCSP2*
MULE CREEK
OLD PRISON FACILITY
MCSP4/RW*
MCSP3*
MAIN JUNCTION VAULT
MCSP6
HIGHWAY 104

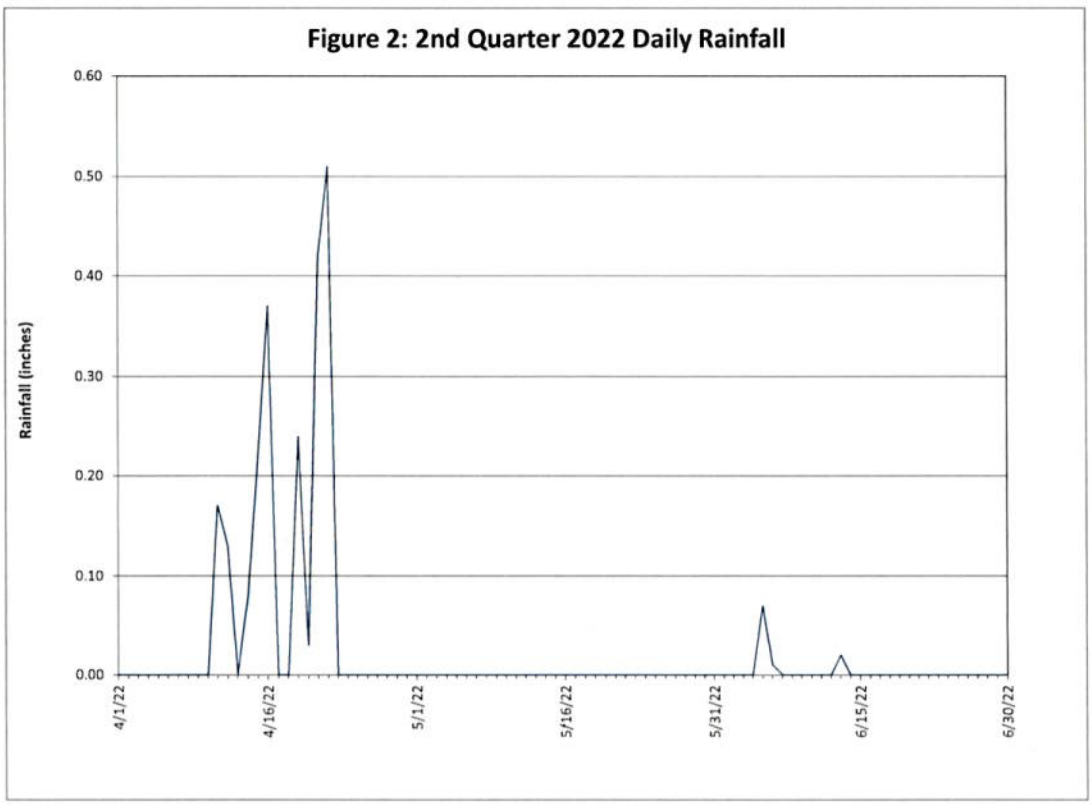
2.0 Amount of Rainfall

There was 2.27 inches of rainfall during the second quarter 2022. Table 2 summarizes the quarterly totals. Daily totals are presented in Appendix 1, Table 1-1.

Table 2. Rainfall, Second Quarter 2022
Mule Creek State Prison, Amador County, California
(in inches)

Month	Rainfall
April	2.17
May	0.00
June	0.10
Quarterly Total	**2.27**

Figure 2 depicts the daily rainfall for the second quarter 2022.



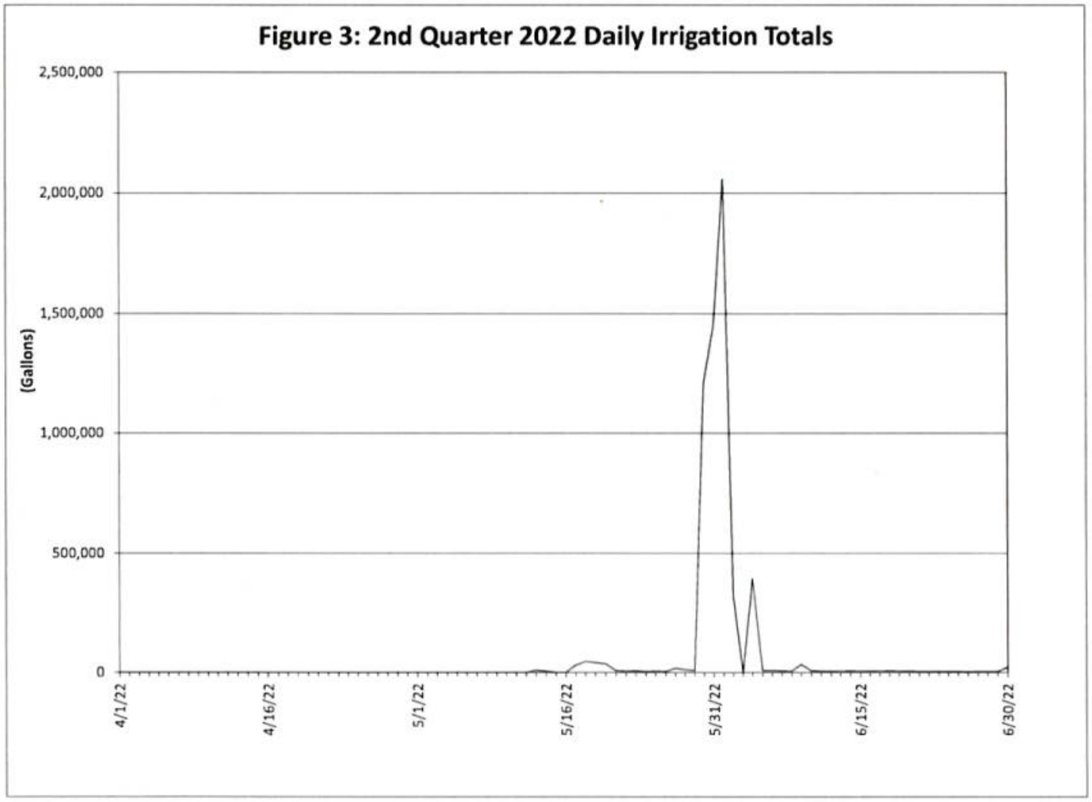
3.0 Irrigation Flows

Irrigation flow for the second quarter 2022 was 5,829,687 gallons. Table 3 summarizes the quarterly totals. Daily totals are presented in Appendix 1, Table 1-1.

**Table 3. Irrigation Flows, Second Quarter 2022
Mule Creek State Prison, Amador County, California
(in gallons)**

Month	Total Flow
April	12
May	2,891,431
June	2,938,244
Quarterly Total	**5,829,687**

Figure 3 depicts daily irrigation totals for the second quarter 2022.



4.0 MCSP5 and MCSP6 Flows

Currently, four flowmeters record stormwater flows that leave the Main Junction Vault and the Secondary Junction Vault. These four flowmeters are installed within four culverts underneath the perimeter road (two culverts per junction vault).

Flowmeters #1 and #2 are installed at the discharge end of two culverts that convey water from the Main Junction Vault to a vegetated swale. This location is internal monitoring point MCSP6.

Flowmeters #3 and #4 are installed at the discharge end of two culverts that convey water from the Secondary Junction Vault to a concrete-lined swale. This location is internal monitoring point MCSP5.

These four flow meters have totalizers that show the total number of gallons of flow. Flow meter totalizer readings are recorded daily by WWTP staff. The total flow passing through internal monitoring points MCSP5 and MCSP6 for the second quarter 2022 reporting period was 1,438,192 gallons. Table 4 summarizes the quarterly totals. Daily totals are presented in Appendix 1, Table 1-1.

Table 4. Outfall Flows, Second Quarter 2022
Mule Creek State Prison, Amador County, California
(in gallons)

Month	Main Internal Monitoring Point MCSP6		Secondary Internal Monitoring Point MCSP5		Total Gallons
	Flowmeter #1	Flowmeter #2	Flowmeter #3	Flowmeter #4	
April	768,692	454,751	29,624	182,030	**1,435,097**
May	757	366	0	611	**1,734**
June	1,321	39	0	1	**1,361**
Quarterly Totals	**770,770**	**455,156**	**29,624**	**182,642**	**1,438,192**

Figure 4 depicts daily flows at MCSP5 compared to daily rainfall totals during the second quarter 2022.

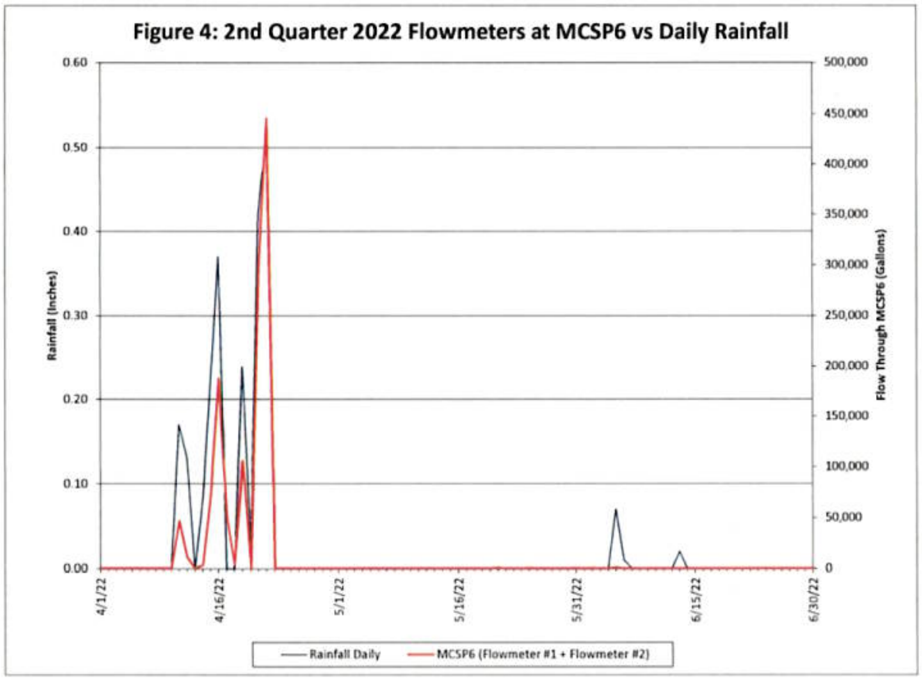
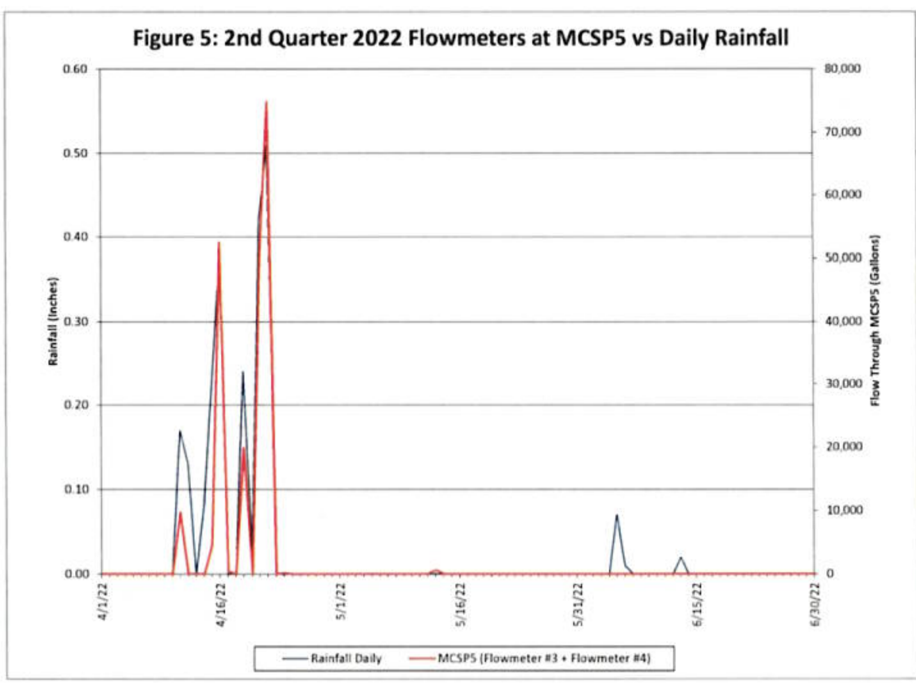


Figure 5 depicts daily flows at MCSP6 compared to daily rainfall totals during the second quarter 2022.



5.0 Stormwater Release Notifications

One stormwater release occurred during the second quarter 2022.

On April 11, 2022, MCSP staff opened main junction vault and secondary junction vault stormwater gates to allow stormwater releases to the vegetated swales that lead to Mule Creek. The Central Valley Regional Water Quality Control Board (RWQCB) was notified of this release by email and through the Stormwater Multiple Application Report Tracking System (SMARTS) database.

**Table 5. Storm Flows, Second Quarter 2022
Mule Creek State Prison, Amador County, California
(in million gallons per day)**

Storm Event	Duration (days)	Total Discharge
April 11, 2022	15	0.23
Quarterly Total	**15**	**0.23**

Storm duration and discharge volumes are recorded in storm reports included in Appendix 2.

6.0 Water Sampling

There was one sampling event during the first quarter 2022:

- Samples were collected from MCSP-1, MCSP-4, MCSP-5, MCSP-6, and MCIC1 on April 11, 2022.

Historical sample results are included in Appendix 3. Certified analytical reports are included in Appendix 4. Laboratory-generated electronic data files with the second quarter 2022 sample results were uploaded to SMARTS. Field parameters measured during sampling are provided in Table 6.

**Table 6. Field Parameters, Second Quarter 2022
Mule Creek State Prison, Amador County, California**

Sample Location	Date	Turbidity (NTU)[a]	Temperature (°C)[b]	pH (standard units)	Dissolved Oxygen (mg/L)[c]
MCSP1	4/11/2022	0.81	14	7.62	5.87
MCSP5	4/11/2022	101	14.7	7.35	6.93
MCSP6	4/11/2022	150	14.7	7.10	7.22
MCSP4	4/11/2022	137	15.3	6.96	6.76
MCIC1	4/11/2022	11.1	15.3	7.68	5.44

[a] NTU: nephelometric turbidity unit
[b] °C: degrees Celsius
[c] mg/l: milligrams per liter

7.0 Compliance with 13383 Order

Aluminum, iron, and manganese were above water quality objectives (WQO), as listed in the Analytical Methods Report, for the second quarter 2022 sampling event at sample locations MCIC1, MCSP4, MCSP5, and MCSP6.

If you have any questions, please call me at (530) 221-5424 or Mike Foget at (707) 441-8855.

Sincerely,

SHN

PROFESSIONAL GEOLOGIST
ROBERT WILLIAMS HESS
Exp 9/22
No. 7403
STATE OF CALIFORNIA

Robert Hess, PG #7403
Project Geologist

7/26/2022

RWH/DMW:lam

Appendices:
1. Daily Totals
2. Storm Reports
3. Current and Historical Data
4. Laboratory Analytical Reports

Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my knowledge and on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there a significant penalties for submitting false information, including the possibility of fine and imprisonment.

Name: ______________________
Estevan Fregeau

Date: 8/1/2022

Daily Totals 1

Table 1-1 Daily Totals, 2nd Quarter 2022
Mule Creek State Prison, Amador County, California
(in gallons, unless otherwise noted)

Date	Flowmeter 1 Daily	Flowmeter 2 Daily	MCSP6 (Flowmeter #1 + Flowmeter #2)	Flowmeter 3 Daily	Flowmeter 4 Daily	MCSP5 (Flowmeter #3 + Flowmeter #4)	Pump #2 Daily	Pump #3 Daily	Pump #5 Daily	Pump #6 Daily	Gallons Pumped to WWTP Daily	Rainfall Daily (inches)	Irrigation Daily
04/01/22	8	0	8	0	0	0	0	0	24	2,261	2,285	0.00	0
04/02/22	0	0	0	0	0	0	0	0	21	1,162	1,183	0.00	0
04/03/22	8	0	8	0	0	0	0	0	13	1,122	1,135	0.00	0
04/04/22	4	0	4	0	0	0	0	0	16	923	939	0.00	0
04/05/22	4	0	4	0	0	0	0	0	19	913	932	0.00	0
04/06/22	4	0	4	0	0	0	0	0	26	722	748	0.00	0
04/07/22	4	0	4	0	0	0	0	0	17	1,116	1,133	0.00	0
04/08/22	6	4	10	0	0	0	0	0	15	907	922	0.00	0
04/09/22	0	0	0	0	0	0	0	0	20	1,100	1,120	0.00	0
04/10/22	0	0	0	0	0	0	0	0	30	1,090	1,120	0.00	0
04/11/22	19,700	26,925	46,625	2,856	6,862	9,718	7,113	5,238	3,982	6,121	22,454	0.17	0
04/12/22	4,688	6,449	11,137	0	0	0	3,211	235	7,630	2,161	13,237	0.13	0
04/13/22	6	0	6	0	0	0	0	0	2,305	1,383	3,688	0.00	0
04/14/22	1,077	2,161	3,238	0	0	0	1,345	0	7,172	805	9,322	0.08	0
04/15/22	26,434	46,788	73,222	982	3,614	4,596	24,064	7,674	28,438	708	60,884	0.22	0
04/16/22	76,526	110,471	186,997	13,637	38,777	52,414	8,302	7,864	5,583	3,894	25,643	0.37	0
04/17/22	42,418	7,089	49,507	0	389	389	7,831	1,207	1,244	421	10,703	0.00	0
04/18/22	4,020	0	4,020	0	0	0	296	0	2,566	2,110	4,972	0.00	0
04/19/22	80,925	24,883	105,808	5,595	14,239	19,834	8,604	7,351	7,668	9,083	32,706	0.24	0
04/20/22	51	0	51	0	0	0	2,526	5,674	1,746	14,243	24,189	0.03	0
04/21/22	222,814	74,471	297,285	4,796	44,930	49,726	18,389	14,395	13,357	13,429	59,570	0.42	0
04/22/22	289,966	155,510	445,476	1,758	73,087	74,845	25,423	24,885	27,817	11,111	89,236	0.51	0
04/23/22	4	0	4	0	0	0	4,634	648	6,321	10,644	22,247	0.00	0
04/24/22	2	0	2	0	132	132	925	0	21	7,816	8,762	0.00	12
04/25/22	8	0	8	0	0	0	50	0	10	5,836	5,896	0.00	0
04/26/22	6	0	6	0	0	0	0	0	5	4,383	4,388	0.00	0
04/27/22	7	0	7	0	0	0	0	0	10	3,802	3,812	0.00	0
04/28/22	2	0	2	0	0	0	0	0	10	3,214	3,224	0.00	0
04/29/22	0	0	0	0	0	0	0	0	12	2,655	2,667	0.00	0
04/30/22	0	0	0	0	0	0	0	0	14	2,523	2,537	0.00	0

Table 1-1 Daily Totals, 2nd Quarter 2022
Mule Creek State Prison, Amador County, California
(in gallons, unless otherwise noted)

Date	Flowmeter 1 Daily	Flowmeter 2 Daily	MCSP6 (Flowmeter #1 + Flowmeter #2)	Flowmeter 3 Daily	Flowmeter 4 Daily	MCSP5 (Flowmeter #3 + Flowmeter #4)	Pump #2 Daily	Pump #3 Daily	Pump #5 Daily	Pump #6 Daily	Gallons Pumped to WWTP Daily	Rainfall Daily (inches)	Irrigation Daily
05/01/22	4	0	4	0	0	0	0	0	16	2,054	2,070	0.00	0
05/02/22	6	0	6	0	0	0	0	0	20	1,907	1,927	0.00	0
05/03/22	0	0	0	0	0	0	0	0	15	1,581	1,596	0.00	0
05/04/22	2	0	2	0	0	0	0	0	24	2,013	2,037	0.00	0
05/05/22	0	0	0	0	0	0	0	0	21	1,786	1,807	0.00	0
05/06/22	0	0	0	0	0	0	0	0	18	1,893	1,911	0.00	0
05/07/22	8	0	8	0	0	0	0	0	15	1,225	1,240	0.00	0
05/08/22	0	0	0	0	0	0	0	0	11	915	926	0.00	0
05/09/22	0	0	0	0	0	0	0	0	10	1,929	1,939	0.00	0
05/10/22	2	0	2	0	0	0	0	0	5	1,725	1,730	0.00	0
05/11/22	0	0	0	0	0	0	6	73	4	1,958	2,041	0.00	0
05/12/22	21	0	21	0	0	0	0	0	3	1,245	1,248	0.00	0
05/13/22	0	0	0	0	611	611	1,206	1,003	4	1,404	3,617	0.00	8,903
05/14/22	0	0	0	0	0	0	0	0	2	1,214	1,216	0.00	4,524
05/15/22	0	0	0	0	0	0	0	0	4	1,214	1,218	0.00	0
05/16/22	0	0	0	0	0	0	0	0	4	1,114	1,118	0.00	0
05/17/22	2	0	2	0	0	0	0	0	2	1,102	1,104	0.00	30,299
05/18/22	8	0	8	0	0	0	0	27	2	2,138	2,167	0.00	45,871
05/19/22	0	0	0	0	0	0	4,188	0	0	3,168	7,356	0.00	40,654
05/20/22	0	0	0	0	0	0	0	1,225	2	4,965	6,192	0.00	35,325
05/21/22	295	366	661	0	0	0	0	0	1,744	2,184	3,928	0.00	7,427
05/22/22	4	0	4	0	0	0	0	0	845	826	1,671	0.00	5,324
05/23/22	6	0	6	0	0	0	0	0	1,266	1,074	2,340	0.00	6,297
05/24/22	4	0	4	0	0	0	0	0	938	857	1,795	0.00	3,942
05/25/22	143	0	143	0	0	0	0	0	357	2,086	2,443	0.00	5,139
05/26/22	15	0	15	0	0	0	0	0	1	1,726	1,727	0.00	3,770
05/27/22	2	0	2	0	0	0	0	0	7	2,141	2,148	0.00	16,689
05/28/22	4	0	4	0	0	0	0	0	7	937	944	0.00	11,097
05/29/22	2	0	2	0	0	0	0	0	9	516	525	0.00	7,065
05/30/22	8	0	8	0	0	0	0	0	17	829	846	0.00	1,211,076
05/31/22	221	0	221	0	0	0	0	0	23	663	686	0.00	1,448,029

Table 1-1 Daily Totals, 2nd Quarter 2022
Mule Creek State Prison, Amador County, California
(in gallons, unless otherwise noted)

Date	Flowmeter 1 Daily	Flowmeter 2 Daily	MCSP6 (Flowmeter #1 + Flowmeter #2)	Flowmeter 3 Daily	Flowmeter 4 Daily	MCSP5 (Flowmeter #3 + Flowmeter #4)	Pump #2 Daily	Pump #3 Daily	Pump #5 Daily	Pump #6 Daily	Gallons Pumped to WWTP Daily	Rainfall Daily (inches)	Irrigation Daily
06/01/22	6	0	6	0	0	0	0	0	18	842	860	0.00	2,056,936
06/02/22	168	0	168	0	0	0	0	0	9	936	945	0.00	316,733
06/03/22	0	0	0	0	0	0	0	0	0	0	0	0.00	0
06/04/22	21	0	21	0	0	0	0	0	24	1,917	1,941	0.00	394,675
06/05/22	924	35	959	0	0	0	240	0	1,514	5,261	7,015	0.07	7,554
06/06/22	8	0	8	0	0	0	0	0	15	1,326	1,341	0.01	6,702
06/07/22	4	0	4	0	0	0	0	0	24	820	844	0.00	6,141
06/08/22	8	0	8	0	1	1	0	0	17	814	831	0.00	5,647
06/09/22	6	0	6	0	0	0	0	0	17	1,536	1,553	0.00	33,170
06/10/22	12	0	12	0	0	0	0	0	21	982	1,003	0.00	6,201
06/11/22	17	0	17	0	0	0	0	0	20	665	685	0.00	5,041
06/12/22	14	0	14	0	0	0	0	0	12	895	907	0.00	4,750
06/13/22	6	0	6	0	0	0	18	1	8	1,543	1,570	0.02	5,361
06/14/22	4	0	4	0	0	0	0	0	14	872	886	0.00	6,029
06/15/22	13	0	13	0	0	0	0	0	25	671	696	0.00	5,494
06/16/22	6	0	6	0	0	0	0	0	22	497	519	0.00	4,898
06/17/22	0	0	0	0	0	0	0	0	11	817	828	0.00	5,432
06/18/22	2	0	2	0	0	0	0	0	29	322	351	0.00	6,168
06/19/22	4	0	4	0	0	0	0	0	38	540	578	0.00	5,578
06/20/22	6	0	6	0	0	0	0	0	30	464	494	0.00	4,588
06/21/22	4	0	4	0	0	0	31	0	24	458	513	0.00	4,231
06/22/22	15	0	15	0	0	0	0	0	7	492	499	0.00	3,517
06/23/22	8	0	8	0	0	0	0	0	1	428	429	0.00	3,247
06/24/22	6	0	6	0	0	0	1	0	21	669	691	0.00	3,115
06/25/22	14	0	14	0	0	0	0	0	27	507	534	0.00	3,268
06/26/22	13	2	15	0	0	0	16	0	14	438	468	0.00	2,237
06/27/22	10	2	12	0	0	0	0	0	36	841	877	0.00	3,076
06/28/22	10	0	10	0	0	0	0	0	42	647	689	0.00	3,277
06/29/22	8	0	8	0	0	0	0	0	37	487	524	0.00	3,138
06/30/22	4	0	4	0	0	0	0	0	56	506	562	0.00	22,040

Storm Reports 2

Storm Event Totals

Gates ***OPENED***	Date	Time	
Main Outfall	4-11-22	1020	operator: STARK
Secondary Outfall	4-11-22	1130	operator: STARK

Gates ***CLOSED***	Date	Time	
Main Outfall	4/26/22	1230	operator: SLATER
Secondary Outfall	4/26/22	1240	operator: "

	Gates Opened	Gates Closed		
O.T.M.1	22871342	23620287		2871342
O.T.M.2	29701845	30129667		427822
O.T.M.3	5253030	5279798		26768
O.T.M.4	10802393	10877561		75168
#2	2645679	2751297	105618	
#3	4255114	4321073	65959	
#5	1834276	1946159	111883	
#6	2524027	2612054	88027	
		Total Gallons Captured	371487	
			Total Gallons O.T.M Meters	3561100

Total Rainfall during storm event ________ Inches

Total Duration of Discharge ________ Hours

Total Discharge ________ MGD

Field Measurements

Site	Date	Time	EC	Turbidity	Temperature	pH	DO
MCSP1	4-11-22	1040	A1Pha umhos/cm	0.81 NTU	14 °C	7.62	5.87 mg/L
MCSP5	4-11-22	1100	Lo 65 umhos/cm	101 NTU	14.7 °C	7.35	6.93 mg/L
MCSP6	4-11-22	1110	umhos/cm	150 NTU	14.7 °C	7.10	7.22 mg/L
MCSP4	4-11-22	1120	umhos/cm	137 NTU	15.3 °C	6.98	6.76 mg/L
MCIC1	4-11-22	1050	umhos/cm	11.1 NTU	15.3 °C	7.68	5.44 mg/L

STATE OF CALIFORNIA — DEPARTMENT OF CORRECTIONS AND REHABILITATION EDMUND G. BROWN JR., GOVERNOR

DIVISION OF ADULT INSTITUTIONS
MULE CREEK STATE PRISON
4001 Highway 104
P.O. Box 409099
Ione, CA, 95640

April 11, 2022

State of California
Water Resources Control Board
Central Valley Regional Water Quality Control Board
Sacramento Office
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Attn: Elizabeth Lee
Senior Water Resources Control Engineer

Title and Date of Report	April 11th 2022- Mule Creek Discharge Notification
Contact	Elizabeth Lee (916) 464-4786
Regulatory Program	Municipal Storm Water
Regulated Party Name (Discharger)	CA Dept of Corrections & Rehabilitation
Facility Name	CDCR - Mule Creek State Prison WWTP
County	Amador

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of the those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

AOrta

Anthony Orta
Correctional Plant Manager
Mule Creek State Prison


04/11/2022 10:23


04/11/2022 10:55


04/11/2022 10:59


04/11/2022 10:34


04/11/2022 11:01


04/11/2022 10:51


04/11/2022 11:00


04/11/2022 10:57


04/11/2022 10:54

Current and Historical Data

3

Table 3-1. **Water Sampling Results**
Mule Creek State Prison, Amador County, California

Sample ID	Sample Date	Oil & Grease	Ammonia	BOD	COD	EC	DOC	SS	TDS	Total Hardness	TSS	Metals, Total				Metals, Dissolved			Total Coliform	E. Coli	Toxicity
												Aluminum	Arsenic	Iron	Manganese	Copper	Lead	Zinc			
Units		mg/L	mg/L	mg/L	mg/L	umohs/cm	mg/L	ml/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	100mls	100mls	% survival
MCSP1	02/02/21	--	--	--	--	238	7.71	--	--	104	<15.0	300	<5.0	347	<10.0	<5.0	5.8	90.1	P	P	--
	02/12/21	--	--	--	--	288	8.30	--	--	132	<15.0	<50.0	<5.0	128	<10.0	<5.0	<5.0	18.0	--	P	--
	03/10/21	--	--	--	--	401	5.50	--	--	182	<15.0	114	<2.5	168	15.2	<5.0	<5.0	132	P	P	--
	03/15/21	--	--	--	--	417	5.2	--	--	176	<15.0	31	<2.5	50	6.0	<5.0	<5.0	150	P	P	100
	03/19/21	--	--	--	--	415	6.28	--	--	178	<15.0	<50.0	<5.0	126	17.4	<5.0	<5.0	40.6	p	p	--
	11/09/21	--	--	--	--	300	11.5	--	--	137	<1.00	<50	<10	<100	43	<20	<50	<20	--	261.3	--
	12/06/21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100
	12/09/21	--	--	--	--	360	10.7	--	--	167	3.8	<50	<10	180	39	<20	<50	<20	--	123.6	--
	02/28/22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100
	03/15/22	--	--	--	--	420	5.15	--	--	200	<1.0	210	<10	290	26	<20	<50	<20	--	206.4	--
	03/28/22	--	--	--	--	440	3.85	--	--	220	5.2	<50	<10	<10	23.0	<20	<50	<20	--	>2,419.6	--
	04/11/22	--	--	--	--	440	4.99	--	--	223	3.7	<50	<10	110	40	<20	<50	<20	--	>2,419.6	--
MCSP2	03/15/21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100
MCSP4	01/27/21	--	--	--	--	138	8.24	--	--	60.0	20.0	3,600	<5.0	3,500	42.1	8.7	<5.0	186	P	P	--
	02/02/21	--	--	--	--	192	5.96	--	--	66.0	39.0	5,640	<5.0	3,380	48.2	5.0	<5.0	125	P	P	--
	02/12/21	--	--	--	--	247	5.02	--	--	116	<15.0	1,440	<5.0	1,090	16.7	<5.0	<5.0	50.1	--	P	--
	03/10/21	--	--	--	--	444	5.28	--	--	184	<15.0	300	<2.5	272	13.1	<5.0	<5.0	176	P	P	--
	03/15/21	--	--	--	--	313	5.60	--	--	134	30.0	3,740	<2.5	2,260	44.5	5.4	<5.0	191	P	P	--
	03/19/21	--	--	--	--	249	4.09	--	--	110	<15.0	1,010	<5.0	725	15.6	<5.0	6.7	104	p	p	--
	10/22/21	--	--	--	--	200	12.9	--	--	82	96	8,300	<10	7,200	250	26	<50	250	--	>2,419.6	--
	11/09/21	--	--	--	--	340	13.3	--	--	155	14.0	1,200	<10	1,000	64	<20	<50	<20	--	1,732.9	--
	12/06/21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	95
	12/09/21	--	--	--	--	120	2.85	--	--	73	430	20,000	<10	23,000	330	<20	<50	57	--	>2,419.6	--
	02/28/22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100
	03/15/22	--	--	--	--	300	10.1	--	--	127	23	2,000	<10	1,300	43	<20	<50	58	--	>2,419.6	--
	03/28/22	--	--	--	--	370	6.63	--	--	187	8.8	430	<10	540	<20	<20	<50	<20	--	>2,419.6	--
	04/11/22	--	--	--	--	120	8.43	--	--	48	68	7,800	<10	4,900	91	<20	<50	110	--	>2,419.6	--
MCSP5	01/27/21	422	0.141	<2.0	71.0	243	12.7	<0.1	225	114	15.0	3,620	<5.0	4,760	43.1	13.1	6.9	103	P	P	--
	02/02/21	<10.0	0.231	5.3	35.3	66.9	4.80	<0.1	103	34.0	83.0	10,600	<5.0	5,490	54.0	6.4	<5.0	176	P	P	--
	03/10/21	<9.57	<0.100	81	26.0	254	6.36	<0.1	177	100	<15.0	3,230	<2.5	1,430	16.6	7.1	<5.0	131	P	P	--
	03/15/21	<10.0	0.186	21	27.5	200	4.86	<0.1	152	76.0	50.0	8,120	3.6	3,950	53.0	8.0	<5.0	224	P	P	--
	03/19/21	256	<0.100	73	27.5	275	6.74	<0.1	190	120.0	<15.0	3,780	<5.0	2,060	21.5	8.5	44.5	182	p	p	--
	10/22/21	<5.0	0.52	5.9	<50	200	8.50	0.20	210	88.0	180	11,000	<10	8,600	97	22	<50	<20	--	>2,419.6	--
	11/09/21	<5.0	<0.20	<5.0	<50	320	10.1	0.10	260	132.0	27	4,400	<10	3,400	59	<20	<50	77	--	1,732.9	--
	12/09/21	<5.0	0.28	<5.0	210	210	4.82	<0.10	170.0	80	62	7,700	<10	5,200	87.0	<20	<50	67	--	2419.6	--
	03/15/22	<5.0	<0.20	10	74	240	12.9	0.10	200.0	98	34	3,800	<10	2,000	54.0	<20	<50	90	--	214.2	--
	03/28/22	<5.0	<0.20	<5.0	74	300	7.1	<0.10	240	130.0	21.0	1,300	<10	770	<20	<20	<50	11	--	547.5	--
	04/11/22	<5.0	<0.20	5.0	<50	180	6.52	<0.10	160	74	54	7,500	<10	3,600	68	<20	<50	65	--	>2,419.6	--
MCSP6	01/27/21	<10.0	0.162	3.4	31.6	209	9.62	0.1	173	110	39.0	4,100	<5.0	5,600	109	16.3	6.3	669	P	P	--
	02/02/21	<10.0	0.161	3.3	25.8	54.9	3.84	<0.1	78.0	26.0	68.0	8,170	<5.0	5,290	78.0	6.0	<5.0	169	P	P	--
	03/10/21	<9.54	0.198	79	23.2	221	5.45	<0.1	142	82.0	<15.0	1,590	<2.5	880	23.8	8.6	<5.0	363	P	P	--
	03/15/21	<9.71	0.235	22	40.0	190	5.3	<0.1	127	78.0	101	11,800	3.2	7,660	106	8.9	<5.0	317	P	P	--
	03/19/21	<10.0	0.209	4.9	26.8	232	9.85	<0.1	157	98.0	31	3,300	<5.0	2,090	39.9	12.9	15.8	334	p	p	--
	10/22/21	<5.0	0.52	7.9	55	230	9.35	<0.10	210	103.0	130	9,800	<10	9,700	190	29	<50	290	--	>2,419.6	--
	11/09/21	<5.0	0.24	<5.0	<50	260	7.99	<0.10	220	108.0	36	3,000	<10	2,300	58	<20	<50	140	--	>2,419.6	--
	12/09/21	<5.0	1.8	15	400	160	3.77	1.2	160	92.0	620	27,000	<10	32,000	520	<20	<50	160	--	>2,419.6	--
	03/15/22	<5.0	0.35	15	72	320	17.3	<0.10	220	136.0	42	4,500	<10	2,800	110	<20	<50	390	--	>2,419.6	--
	03/28/22	<5.0	0.24	7.5	72	230	10.6	<0.10	180	90.0	17	1,600	<10	970	54	<20	<50	320	--	>2,419.6	--
	04/11/22	<5.0	<0.20	7.1	52	110	6.15	0.10	110	46.0	68	7,100	<10	4,400	83	<20	<50	150	--	>2,419.6	--
MCIC1	03/15/22	<5.0	0.28	<5.0	<50	60	4.46	<0.10	50	19	12.0	520	<10	660	28	<20	<50	<20	--	816.4	--
	03/28/22	<5.0	<0.20	<5.0	83	700	3.03	0.10	450	343	6.2	480	<10	480	<20	<20	<50	<20	--	28.1	--
	04/11/22	<5.0	<0.20	<5.0	<50	630	6.64	0.10	400	308	11	1,200	<10	1,200	58	<20	<50	<20	--	920.8	--

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20210329-MuleCreek-13383-HistoricalTables\All Constituents

EXHIBIT 28

Stormwater Master Plan

Mule Creek State Prison

4001 Highway 104, Ione, California 95640

Prepared by

Geosyntec consultants

engineers | scientists | innovators

3043 Gold Canal Drive, Suite 100
Rancho Cordova, California 95670

Prepared for

4001 Highway 104
Ione, California 95640

Project Number: SAC220A/04

7 March 2018

Geosyntec consultants

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Geosyntec consultants

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1. INTRODUCTION

The Mule Creek State Prison (MCSP; Site or facility) is located at 4001 Highway 104 in the City of Ione in California and is operated by the California Department of Corrections and Rehabilitation (CDCR). The facility location is shown in Figure 1. The facility is composed of two prisons: the Mule Creek facility and the Mule Creek Infill Complex (MCIC) facility. These two prisons are noncontiguous, but operated under the same administration.

This Stormwater Master Plan (Plan) has been created to provide the facility with a guide on how to implement appropriate stormwater management practices to prevent the discharge of pollutants in Site stormwater. This Plan does not follow any specific regulatory or permit requirements and has been prepared solely to assist the facility with implementing good stormwater management practices.

1.1 Plan Organization

Following this introduction, this Plan is organized as follows:

- Section 2 "Facility Information" describes the overall layout and drainage of the Mule Creek and MCIC prisons.
- Section 3 "Illicit Discharge Detection and Elimination Program" defines illicit discharges and describes how they can be detected and eliminated.
- Section 4 "Pollution Prevention and Good Housekeeping" provides a description of areas identified to generate stormwater and non-stormwater pollutants and describes measures needed to maintain the stormwater conveyance system, the facility grounds, and pesticide, herbicide, and fertilizer application practices.
- Section 5 "Construction Site Runoff Control Program" addresses the measures to be implemented whenever construction activities take place at the Site.
- Section 6 "Education Program" outlines the stormwater training program for facility staff and certain inmates.

4. POLLUTION PREVENTION AND GOOD HOUSEKEEPING

This section of the Plan provides a summary of CDCR's program to mitigate the potential for pollutant discharge from the facility to local receiving waters.

This section covers the following:

- Description of areas identified within the Mule Creek and MCIC facilities that have a high potential to generate stormwater and non-stormwater pollutants and the BMPs needed to prevent the discharge of these pollutants;
- BMPs needed to maintain the stormwater conveyance system;
- BMPs needed for grounds maintenance; and
- BMPs for pesticide, herbicide, and fertilizer application.

Applicable stormwater BMP factsheets from the CASQA BMP Municipal and Industrial Handbooks are referenced throughout this section of the Plan. These fact sheets provide general guidance on how certain BMPs should be implemented and are provided in Appendices C and D.

An inspection form ("Quarterly Mule Creek State Prison Inspection – BMP Implementation") is provided in Appendix B to help the facility document pollution prevention and good housekeeping practices throughout the Site. These forms are to be used quarterly to conduct visual observations of the facility's BMPs and ensure they are in place.

4.1 Inventory of Prison Facilities

An inventory of all prison activities was conducted and each area was evaluated as to whether there were potential pollutant sources that could contact stormwater. These facilities have been identified as "pollutant hotspots" for having a high potential to generate stormwater or non-stormwater pollutants. This Plan identifies the stormwater BMPs needed to be installed, implemented, and maintained to minimize the discharge of pollutants in stormwater from these activities.

In addition, these areas were also evaluated to determine if coverage under the California's General Permit for Stormwater Discharges Associated with Industrial Activities (IGP) is required. The California IGP, issued by the State Water Resources

Control Board (SWRCB), was created to regulate the quality of the stormwater discharges from industrial facilities to the waters of the United States. The industrial activities covered under the IGP are based on the facility's Standard Industrial Classification (SIC) code. The activities covered under the IGP are typically manufacturing-related and are normally related to a revenue-generating business. Therefore, activities that exist solely to support the prison (such as laundry services, maintenance shops, etc.) do not require coverage. Two areas within the facility were identified as requiring IGP coverage: the CalPIA coffee roasting facility (SIC Code 2095: Roasted Coffee) and the CalPIA meat packing facility (SIC Code 2011: Meat Packing Plants). These two facilities are manufacturing, revenue-generating facilities with SIC codes that require coverage.

The IGP offers two types of coverage: Notice of Intent (NOI) Coverage and No Exposure Certification (NEC) Coverage. NOI coverage is applicable to industrial facilities that discharge stormwater associated with industrial activities to the waters of the United States (i.e. facilities that have industrial activities or materials exposed to stormwater). NEC coverage is applicable to industrial facilities that have no industrial activities or materials exposed to stormwater (i.e., facilities where all the industrial activities and materials are under cover). Both the CalPIA meat packing and coffee roasting facilities were determined to follow under the NEC coverage since all activities are conducted within a building with no industrial activity exposed to stormwater.

The following sections identify the hotspots and provides a summary of the activities conducted within each hotspot area, overall stormwater drainage, potential pollutant sources, and the required BMPs. A summary of the hotspots is provided in Table 4.1 under Section 4.1.9. The hotspots are identified in Figures 5 and 6.

4.1.1 Wastewater Treatment Plant (WWTP) – Mule Creek Facility

Description of Activities and Pollutant Source Assessment

A WWTP plant is located northeast of the secured perimeter area of the Mule Creek facility and is regulated under the Central Valley Regional Water Quality Control Board Waste Discharge Requirements (WDRs), Order R5-2015-0129. The WWTP provides wastewater treatment and disposal of wastewater generated from the Mule Creek and MCIC facilities. Wastewater, which has received primary treatment (screening) from the headworks facility (refer to Section 4.1.3), is treated and managed at the WWTP through an oxidation ditch, three clarifiers, sand filtration, and a chlorine contact chamber. The treated effluent is then applied to land through the use of sprinklers or stored in an Effluent Storage Reservoir.

Sludge collected from the bottom of the clarifiers is pumped to a sludge belt press facility to remove excess water and is then transported to sludge drying beds. The sludge beds are either covered or uncovered. The covered bed is concrete-lined and is the primary bed used. It is also the bed used during the winter season. There are two types of uncovered beds: one lined with concrete and six that are lined with sand and gravel at the bottom with an underdrain system that returns flow to the oxidation ditch. The uncovered lined beds are only used if the covered bed is out of service. The uncovered, concrete bed is used primarily during the summer. The dried sludge is put in covered dumpsters that are then hauled off Site for landfill disposal.

The WWTP also has outdoor storage of equipment used to support the main treatment operations, a small office building, an enclosure housing a 5,000-gallon liquid chlorine tank, a pump station, two tanks for sludge storage, and a backup generator.

The WWTP is almost entirely unpaved. Unpaved areas are generally either covered with gravel or are vegetated. Stormwater runoff in this area either infiltrates or collects in drain inlets located throughout the WWTP. The collected stormwater is conveyed by buried pipes to an outfall located south of the chlorine contact chamber. The outfall discharges water to a vegetated area. Stormwater that does not infiltrate or collect inside a drain inlet, sheet flows in a southerly direction towards the main outfall.

The WWTP has a design capacity of less than 1.0 million gallons per day, excluding it from the requirement for IGP coverage. The WWTP WDR permit also specifically states that the plant is excluded from IGP coverage. Although most of the operations at the WWTP are contained, the WWTP is still considered a hotspot due to the potential for stormwater to contact sludge from the drying beds. When handling the dried sludge from the drying beds, sludge can track out with the hauling equipment and could potentially contact stormwater.

BMPs

The following BMPs are recommended to be implemented at all times at the WWTP to prevent the discharge of pollutants in stormwater:

- Train and educate employees and inmates on proper sludge handling methods to eliminate sludge trackout;
- Inspect areas around the sludge drying beds for sludge track out;
- Ensure the requirements under the Spill Prevention Control and Countermeasure (SPCC) Plan are being implemented for the diesel backup generator;

- Sweep the concrete apron surrounding the covered, drying bed at the end of each day; and
- Load sludge in a contained area.

4.1.2 Firing Range – Mule Creek Facility

Description of Activities and Pollutant Source Assessment

The Firing Range is operated by CDCR staff and is used for Correctional Officer training and qualification testing. The Firing Range is located northeast of the Mule Creek facility and northwest of the WWTP and is composed of two shooting ranges. The Firing Range is entirely unpaved with the exception of the firing line which is paved and covered. The unpaved areas are bare and are not covered by gravel or vegetation, causing these areas to erode during storm events. Drain inlets are located throughout the unpaved portions of the Firing Range and are connected by underground piping. Drain inlets are also located along the perimeter of the Firing Range.

This activity is considered a hotspot because of the bullet fragments that accumulate on the ground and the erosion issues from the unpaved areas. The main concern with the bullet fragments are the heavy metals, primarily lead, that can accumulate in the surface soil. Lead could then potentially be transported in runoff during storm events. The other concern at the Firing Range is the location of the drain inlets. Because the unpaved areas are maintained bare earth, these areas are highly susceptible to erosion during storm events. As a result, sediment can be transported through stormwater runoff, accumulate inside the drain inlets, and ultimately discharge to Mule Creek.

BMPs

The following BMPs are recommended to be implemented at all times at the Firing Range to prevent the discharge of pollutants in stormwater:

- Conduct visual inspections of storm drains prior to the wet season and after storm events;
- Ensure drain inlets are clear of sediment, debris, trash, and bullet fragments;
- Consider stabilizing the unpaved areas to lock down the sediment and reduce the potential for erosion during storm events;
- Protect the drain inlets with straw wattles to prevent sediment and bullet fragments from entering the storm drains. Check integrity of straw wattles prior to the wet season and replace straw wattle that is accumulated with sediment;

- Install drain inlets filters, where feasible, to help remove sediment that ends up in stormwater runoff. Ensure inserts are clear of debris, trash, and sediment prior to the wet season;
- Cover drain inlets with rubber mats or other covers during the dry season to prevent erodible soils and spent shells from entering drain; and
- As needed, clean out the storm drains prior to the wet season.

4.1.3 WWTP Headworks – Mule Creek Facility

Description of Activities and Pollutant Source Assessment

The Headworks Facility is located east of the facility and is the first unit process of the wastewater plant treatment train. Wastewater is screened through two bar screens prior to being pumped to the WWTP for treatment. Objects that are screened out are conveyed to two dumpsters prior to landfill disposal. In addition to the bar screens, the headworks facility also has a backup generator, a shed where the system controls are located, and a shed for storage of a diesel tank (secondarily contained). A concrete pad with a drain inlet is located in the southeastern corner of the headworks facility.

The Headworks Facility is entirely paved. The facility is sloped such that stormwater runoff sheet flows in a southerly direction and then towards the two southern corners of the Headworks area.

This facility was identified as a hotspot due to the potential for the bins storing the screened materials to leak. The filling and storage areas are not secondarily contained and bin leaks would mix with precipitation and be discharged with stormwater.

BMPs

The following BMPs are recommended to be implemented at all times at the headworks facility to prevent the discharge of pollutants in stormwater:

- Conduct visual inspections of the waste bins weekly. During the inspections, observe for any leaks or signs of leaks from the bins. Also note if bins are in poor condition and in need of replacement;
- Provide a secondarily-contained area for waste bins to prevent bin leaks from contacting stormwater. Water or liquids that accumulate inside the secondary containment could be routed back into the system to be pumped to the WWTP; and

- Ensure the requirements under the SPCC Plan are being implemented for the diesel tank.

4.1.4 Welding and Fabrication Shop – Mule Creek Facility

Description of Activities and Pollutant Source Assessment

The welding and fabrication shop is located north of the Mule Creek facility and is used for miscellaneous maintenance activities. Welding and fabrication activities are conducted indoors inside a shop or underneath an awning extending from the shop. Outside of the shop there is a boneyard for storage of miscellaneous equipment and materials such as pipes on pipe racks, steel plates, and scrap metal. Outdoor storage of materials is not covered. The outdoor area behind the shop is largely paved with exception of the back portion which is unpaved and covered with gravel. There are two storm drains in the paved, outdoor area: one located adjacent and to the east of the shop and one located north of the shop. Stormwater generally flows towards these two storm drains. Stormwater from the unpaved portion infiltrates or flows away from the shop towards a vegetated area.

The welding and fabrication shop is considered a hotspot because of the potential of metal grindings and slag from the outdoor welding and fabrication activities contacting stormwater and entering the storm drains. Also, there is a large amount of outdoor material storage, especially rusty metal parts, located near the drain inlets.

BMPs

The following BMPs are recommended to be implemented at all times at the welding and fabrication shop to prevent the discharge of pollutants in stormwater:

- Routinely sweep dust generated from welding activities to prevent contact with stormwater;
- Protect storm drain inlets with straw wattles (fiber rolls) or drain inlet filters to filter out particulate pollutants in stormwater. Check integrity of straw wattles prior to the wet season and replace straw wattle that is accumulated with sediment. Ensure inserts are clear of debris, trash, and sediment prior to the wet season;
- Cover drain inlets with rubber mats or other covers during the dry season to prevent erodible soils from entering drain;
- Do not store equipment and materials over storm drains; and
- Clean out the storm drains prior to the wet season.

4.1.5 Vehicle Maintenance Shop & Fueling Area – Mule Creek Facility

Description of Activities and Pollutant Source Assessment

The vehicle maintenance shop and fueling area is located north of the Mule Creek facility and west of the welding and fabrication shop. Within this area, facility vehicles and equipment are maintained and fuel dispensers are available for vehicle fueling. Outside of the maintenance shop is a paved parking lot with a dispenser island and parking stalls for equipment and vehicle parking. Empty drums and used batteries, mostly on wood pallets, are stored on the parking lot, as well as unused wood pallets, a metal rack, and scrap metal. Along the eastern portion of the parking lot, the asphalt is broken and in poor repair. As a result, the underlying soil and aggregate base is partially exposed. An awning attached to the east side of the shop is used as cover for a metal cutter and temporary material storage (such as drums, batteries, and tires). The area underneath the awning is paved. A small area, located north of the awning, is used for storage of used tires. A wash pad is located west and adjacent to the shop. Wash water collects in a drain that discharges to the sanitary sewer. Stormwater is captured by storm drains located throughout the parking lot.

The vehicle maintenance shop and fueling area are considered a hotspot for the following reasons:

- Oil drippings from the parked vehicles and equipment were observed throughout the parking lot;
- Erosion and sediment transport from the broken asphalt areas;
- Outdoor storage of tires, drums, batteries, and scrap metal exposed to stormwater; and
- Sediment buildup inside storm drains due to erosion from unpaved areas.

The main pollutants of concern at the vehicle maintenance shop and fueling area are: TSS, oil and grease, iron, and aluminum.

BMPs

The following BMPs are recommended to be implemented at all times at the vehicle maintenance shop and fueling area to prevent the discharge of pollutants in stormwater:

- Materials stored outdoors should be placed on wood pallets (stored off the pavement/ground) at all times and covered with tarps to prevent contact with stormwater;

- Inspect and clean out the storm drains (as needed) prior to the wet season;
- Inspect equipment stored outdoors that may spill or leak weekly. Observed leaks, drips, and spills should be immediately cleaned with absorbent materials. Use of water during clean up should be minimized;
- Store lead acid batteries in lockers and secondarily contain, if storage is long term;
- Cover drain inlets with rubber mats or other covers during the dry season to prevent erodible soils from entering drain;
- Repair asphalt in areas with broken asphalt to prevent erosion issues; and
- Protect storm drains with straw wattles (fiber rolls) or filters to filter out pollutants in stormwater. Check integrity of straw wattles prior to the wet season and replace straw wattles that is accumulated with sediment.

4.1.6 Recycle Yard – Mule Creek Facility

Description of Activities and Pollutant Source Assessment

The recycle yard is located north and northwest of the vehicle maintenance shop. The recycle yard is used for sorting recyclables generated from the facility prior to off-Site disposal. The yard is entirely unpaved and is covered with a layer of gravel. There is one office building and two canopies located within the yard. One canopy is used for temporary storage of baled products and the other canopy is used for storage of a paper baler. Recyclables are stored inside metal bins, Conex containers, on wood pallets, or underneath the canopy. Stormwater at the yard either infiltrates or flows towards two storm drains located around the canopy where the baler is located.

The recycle yard is considered a hotspot because of fugitive recyclables that can be found on the ground, outdoor storage of recyclables that are not covered, and erosion from the gravel area. Overtime, the gravel area accumulates sediment which then erodes and has the potential to enter the storm drain inlet.

BMPs

The following BMPs are recommended to be implemented at all times at the recycle yard to prevent the discharge of pollutants in stormwater:

- When possible, store recyclables under covered areas or cover with tarps when not in active use and during storm events. Only store clean and covered bins outdoors;

- Maintain gravel-covered areas and replace or supplement gravel whenever there is significant sediment accumulation; and
- Inspect areas weekly where recyclables are stored. Pick up and properly dispose in covered containers fugitive recyclables and waste materials found in and around the yard.

4.1.7 Construction Lay Down Area – Mule Creek Facility

Description of Activities and Pollutant Source Assessment

The construction lay down area is located northwest of the Mule Creek facility. This area is used for storage of temporary construction materials and equipment and is a fenced area. Construction equipment and material include, but are not limited to, stockpiles of sand and aggregate, pipes, scrap material, cement and concrete bags, plywood, paint, chain link fences, loaders, backhoes, excavators, etc. The construction laydown area is used by CDCR staff and by construction contractors. A large majority of the construction laydown area is unpaved and covered with gravel. Stockpiles of broken concrete are stored north of the laydown area, outside the fenced area. Generally, stormwater either infiltrates or sheet flows away from the laydown area in a northerly direction towards a vegetated area.

The construction laydown area is considered a hotspot due to the large amount of materials stored in this area and because of the stockpiles of crushed concrete (considered waste material).

BMPs

The following BMPs are recommended to be implemented at all times at the construction laydown area to prevent the discharge of pollutants in stormwater:

- Inspect the construction laydown area weekly and ensure construction equipment is not leaking, construction materials are stored on pallets, and the area is tidy;
- Place fiber rolls around soil, sand, rock, and waste material stockpiles when not being actively used to prevent the erosion and migration of materials;
- Minimize crushed concrete stockpiles and do not store materials on site for extended periods of time;
- Maintain gravel-covered areas and replace or supplement gravel whenever there is significant sediment accumulation; and
- Whenever possible, store construction material and equipment under cover to prevent contact with stormwater.

4.1.8 Vocational Welding – Mule Creek Facility

Description of Activities and Pollutant Source Assessment

Vocational welding activities are conducted within the "A/B Corridor" at the Mule Creek facility. Despite that the vocational program is engaged in metal fabrication, the program was identified as not requiring IGP coverage since these activities are conducted to support the overall prison rehabilitation program and are not revenue-generating.

The area used for the vocational program is paved and has outdoor storage of metal racks with metal sheets and pipes. Stormwater runoff collects in a storm drain which discharges to an underground pipe that runs below the "A/B Corridor". The vocational welding area is considered a hotspot due to the dust and particulate that is generated during welding activities which then is deposited on the ground. This dust then becomes exposed and may migrate in stormwater.

BMPs

The following BMPs are recommended to be implemented at all times at areas where vocational welding activities are conducted to prevent the discharge of pollutants in stormwater:

- Routinely sweep dust generated from welding activities at the end of day to prevent contact with stormwater;
- Cover storm drains during the dry season to prevent dust from entering the stormwater conveyance system; and
- Minimize outdoor storage of metal pipes and sheets. If materials need to be stored outdoors, they should be stored away from the storm drains and, if possible, should be tarped prior to storm events.

4.1.9 Summary of Inventory of Prison Facilities

Table 4.1:

Area/Activity (Facility)	Activity	Pollutant Source	BMPs
Wastewater Treatment Plant (WWTP) (Mule Creek Facility)	The WWTP treats wastewater from the Mule Creek and MCIC facilities. The WWTP consists of an oxidation pond, three clarifiers, sand filtration a chlorine contact chamber, a sludge belt press facility, and sludge drying beds.	-Sludge trackout from sludge drying beds	-Train and educate employees and inmates on proper sludge handling methods to eliminate sludge trackout. -Inspect areas around the sludge drying beds for sludge track out. -Ensure the requirements under the Spill Prevention Control and Countermeasure (SPCC) Plan are being implemented for the diesel backup generator. -Sweep the concrete apron surrounding the covered, drying bed at the end of each day. -Load sludge in a contained area.

Area/Activity (Facility)	Activity	Pollutant Source	BMPs
Firing Range (Mule Creek Facility)	Area used by facility staff for shooting training/practice.	-Erosion from the unpaved areas of the firing range; sediment accumulation in storm drain inlets located within unpaved areas -Bullets and bullet fragments on the ground that could get mobilized to the storm drains	-Conduct visual inspections of storm drains prior to the wet season and after storm events. -Ensure drain inlets are clear of sediment, debris, trash, and bullet fragments. -Consider stabilizing the unpaved areas to lock down the sediment and reduce the potential for erosion during storm events. -Protect the drain inlets with straw wattles to prevent sediment and bullet fragments from entering the storm drains. Check integrity of straw wattles prior to the wet season and replace straw wattle that is accumulated with sediment. -Install drain inlets filters, where feasible, to help remove sediment that ends up in stormwater runoff. Ensure inserts are clear of debris, trash, and sediment prior to the wet season. -Cover drain inlets with rubber mats or other covers during the dry season to prevent erodible soils and spent shells from entering drain. -As needed, clean out the storm drains prior to the wet season.

Area/Activity (Facility)	Activity	Pollutant Source	BMPs
WWTP Headworks (Mule Creek Facility)	The WWTP headworks is used for primary treatment of wastewater from the Mule Creek and MCIC facilities prior to treatment at the WWTP	-Potential for leak from the bins storing screened materials	-Conduct visual inspections of the waste bins weekly. During the inspections, observe for any leaks or signs of leaks from the bins. Also note if bins are in poor condition and in need of replacement. -Provide a secondarily-contained area for waste bins to prevent bin leaks from contacting stormwater. Water or liquids that accumulate inside the secondary containment could be routed back into the system to be pumped to the WWTP. -Ensure the requirements under the SPCC Plan are being implemented for the diesel tank.
Welding and Fabrication Shop (Mule Creek Facility)	Area used for welding and fabrication activities; outdoor storage of miscellaneous equipment and material storage.	-Potential of metal grindings and slag from outdoor welding activities contacting stormwater -Large amount of outdoor storage of rusty materials and equipment	-Routinely sweep dust generated from welding activities to prevent contact with stormwater. -Protect storm drain inlets with straw wattles (fiber rolls) or drain inlet filters to filter out particulate pollutants in stormwater. Check integrity of straw wattles prior to the wet season and replace straw wattle that is accumulated with sediment. Ensure inserts are clear of debris, trash, and sediment prior to the wet season. -Cover drain inlets with rubber mats or other covers during the dry season to prevent erodible soils from entering drain. -Do not store equipment and materials over storm drains. -Clean out the storm drains prior to the wet season.

Area/Activity (Facility)	Activity	Pollutant Source	BMPs
Vehicle Maintenance Shop and Fueling Area (Mule Creek Facility)	Area with a shop used for vehicle maintenance, a parking lot with a fuel dispenser island, and outdoor storage of equipment and materials.	-Oil drippings from parked vehicles and equipment -Erosion from broken asphalt areas -Outdoor storage of tires, drums, batteries, and scrap metal exposed to stormwater -Sediment buildup inside storm drains due to erosion from unpaved areas	-Materials stored outdoors should be placed on wood pallets (stored off the pavement/ground) at all times and covered with tarps to prevent contact with stormwater. -Inspect and clean out the storm drains (as needed) prior to the wet season. -Inspect equipment stored outdoors that may spill or leak weekly. Observed leaks, drips, and spills should be immediately cleaned with absorbent materials. Use of water during clean up should be minimized. -Store lead acid batteries in lockers and secondarily contain, if storage is long term. -Cover drain inlets with rubber mats or other covers during the dry season to prevent erodible soils from entering drain. -Repair asphalt in areas with broken asphalt to prevent erosion issues. -Protect storm drains with straw wattles (fiber rolls) or filters to filter out pollutants in stormwater. Check integrity of straw wattles prior to the wet season and replace straw wattles that is accumulated with sediment.

Area/Activity (Facility)	Activity	Pollutant Source	BMPs
Recycle Yard (Mule Creek Facility)	Area used for sorting recyclables generated from the facility prior to off-Site disposal.	-Fugitive recyclables found on the ground that could contact stormwater -Outdoor storage of recyclables that are not covered -Erosion from the gravel area	-When possible, store recyclables under covered areas or cover with tarps when not in active use and during storm events. Only store clean and covered bins outdoors. -Maintain gravel-covered areas and replace or supplement gravel whenever there is significant sediment accumulation. -Inspect areas weekly where recyclables are stored. Pick up and properly dispose in covered containers fugitive recyclables and waste materials found in and around the yard.
Construction Laydown Area (Mule Creek Facility)	Area used for storage of construction-related equipment and materials; temporary staging area used by construction contractors.	-Large amount of materials stored that are uncovered -Stockpiles of crushed concrete that are uncovered and that can contact stormwater	-Inspect the construction laydown area weekly and ensure construction equipment is not leaking, construction materials are stored on pallets, and the area is tidy. -Place fiber rolls around soil, sand, rock, and waste material stockpiles when not being actively used to prevent the erosion and migration of materials. -Minimize crushed concrete stockpiles and do not store materials on site for extended periods of time. -Maintain gravel-covered areas and replace or supplement gravel whenever there is significant sediment accumulation. -Whenever possible, store construction material and equipment under cover to prevent contact with stormwater.

Area/Activity (Facility)	Activity	Pollutant Source	BMPs
Vocational Welding Activities (Mule Creek Facility)	Area used for vocational education program (welding)	-Dust from welding activities that deposit on the paved areas	-Routinely sweep dust generated from welding activities at the end of day to prevent contact with stormwater. -Cover storm drains during the dry season to prevent dust from entering the stormwater conveyance system. -Minimize outdoor storage of metal pipes and sheets. If materials need to be stored outdoors, they should be stored away from the storm drains and, if possible, should be tarped prior to storm events.

EXHIBIT 29

Expert Opinion Report of Robert W. Emerick, Ph.D., P.E.

An Assessment of Wastewater Contributions in Mule Creek State Prison Stormwater

Discharged to Mule Creek

August 1, 2022

In the Matter of

California Sportfishing Protection Alliance v. Kathleen Allison, in her official capacity as Secretary of the California Department of Corrections and Rehabilitation,

Case No. 2:20-cv-02482-WBS-AC, U.S. District Court, Eastern District of California,

And,

County of Amador v. Kathleen Allison, in her official capacity as Secretary of the California Department of Corrections and Rehabilitation; Patrick Covello in his official capacity of Warden of California Department of Corrections and Rehabilitation Mule Creek State Prison,

Case No. 2:21-cv-0038-WBS-AC, U.S. District Court, Eastern District of California.

OPINIONS

1. Discharges occur through the Mule Creek State Prison's stormwater conveyance system that contain a sewage component.

2. The most likely source of the sewage found in the stormwater conveyance system at the facility is from the prison sanitary sewer system.

3. Discharges contaminated with sewage through the MS4 are occurring both during rain events and during dry weather periods.

BACKGROUND

I have been retained by the Plaintiff, California Sportfishing Protection Alliance ("CSPA") to prepare this Expert Report to evaluate whether discharges through the Mule Creek State Prison's stormwater conveyance system contain a sewage component. Compensation to myself for the work resulting in this report and for future work is $300/hour and testimony at deposition is $400 per hour.

Regulated indicator bacteria (e.g., total coliform, fecal coliform, *E. coli*) have been observed in stormwater and non-stormwater discharges from Mule Creek State Prison at concentrations that exceed water quality standards. Mule Creek State Prison has used DNA sampling and analysis to attribute the source of bacteria to natural sources (e.g., birds, deer) rather than from human sources. I understand the prison's contention to be that while coliform do occur in sewage, their presence does not necessarily indicate sewage contamination because coliform can be excreted by other warm-blooded animals and can grow naturally in the environment.

It is important to distinguish between regulated indicators and regulated contaminants. Chemicals such as priority pollutants (e.g., copper, tributyltin) are regulated directly because the presence of specific

chemicals has the potential to cause humans and/or aquatic life toxicity. Other contaminants (e.g., coliform bacteria) are regulated because they provide an indication that there is a wastewater component to a discharge, they give an indication of the degree of health risk that might be present, and they are easier and cheaper to monitor than other alternatives. For example, wastewaters are disinfected because they originate from humans and are likely to contain pathogens that, if not disinfected, could adversely impact the health of the community. Stormwaters are not typically disinfected because they originate from rainfall, they do not pass through humans prior to discharge to the environment, so there is not as great a concern that they will adversely impact the health of a community. If a stormwater discharge contains a waste fraction that passed through a human, Clean Water Act guidance is that the entire waste stream should undergo disinfection to protect the health of the community.

There are numerous studies and monitoring results that show elevated concentrations of total coliform bacteria, fecal coliform bacteria, and *E. coli* in stormwater discharged from Mule Creek State Prison. CSPA contends that some wastewater generated at the prison facility is finding its way into the stormwater collection system where it is subsequently discharged intermittently to Mule Creek, in violation of its stormwater permit. I was contacted by CSPA as part of their efforts to determine whether it was possible to definitively state whether there is some contribution of wastewater in the stormwater discharges to Mule Creek.

The use of DNA to identify sources of coliform has been a source of research for decades. I do not believe it to be the most conclusive line of evidence for assessing whether there is a human-impact component to a discharge. Aside from DNA source identification methods not yet being approved for use for compliance purposes by the Environmental Protection Agency (EPA), I believe there are better and less variable methods for establishing the presence of a sewage component.

DNA can originate from both human and animal sources. It takes effort to distinguish between the two sources. Coliform comes from both humans and animals so it, too, takes effort to distinguish between two sources. It is my contention that a direct method of determining whether there is a wastewater component within stormwater is to monitor the stormwater for chemicals that can only pass through humans. If human-derived chemicals are found in a water sample, it is reasonable to suggest that some fraction of human waste also exists in that water sample.

Pharmaceuticals and personal care products are chemicals, manufactured and used by humans, that cannot occur naturally in the environment. Their presence in rivers, streams, and groundwater results from the release of sewage, typically human sewage, but cattle and other animal-based operations can also release some human derived chemicals if they are used to enhance the health of the animal (e.g., antibiotics fed to cattle will result in some fraction of that antibiotic being released from the animal as part of their sewage). Cattle are not fed coffee, however, so although an antibiotic might be found in the discharge from an animal facility, caffeine would not be expected. Therefore, chemicals can be properly selected such that observing their presence would indicate contamination by human waste.

Mule Creek State Prison collects rainfall to discharge as stormwater. Rainfall should not contain human-derived chemicals. Mule Creek State Prison also pumps out underground vaults that get inundated by groundwater and discharges that water to the stormwater collection network for discharge. Groundwater should not contain human-derived chemicals unless it was impacted by a sewage release. Therefore, we can monitor for select pharmaceuticals and should we observe their presence, we can state with certainty that there is a sewage component.

CREDENTIALS

Education. I received a bachelor of science degree in Civil Engineering from the University of California at Davis in 1991. I received a master of science in Civil Engineering from the University of California at Davis in 1992. My master degree thesis was focused on modeling the inactivation of coliform bacteria through recycled water UV disinfection systems and was published in its entirety by the Water Environment Research Foundation. I received a doctor of philosophy degree in Civil and Environmental Engineering from the University of California at Davis in 1998 with doctoral minors in ecology and statistics/stochastic modeling. My Ph.D. dissertation was focused on determining wastewater treatment process type impacts on the distribution and placement of coliform bacteria within wastewater particles and modeling their subsequent inactivation by UV light as they passed through UV disinfection reactors. The research was funded in part by EPA through their STAR program, the Sacramento County Regional Wastewater Plant, and the Water Environment Research Foundation. My dissertation was published in full by the Water Environment Research Foundation.

Professional Career. I graduated from the University of California at Davis with a Ph.D. in 1998 (December) and found employment with ECO:LOGIC Engineering (Rocklin, CA). ECO:LOGIC Engineering primarily assisted small to medium sized cities and public agencies (i.e., discharging less than about 10 million gallons per day on an average dry weather basis) with their planning, permitting, design, construction management, and operation needs associated with water, wastewater, and recycled water infrastructure. This client size and type is significant, because such small communities in California rarely are located near large rivers, and nearby streams suitable for discharge are most often effluent-dominated owing to little to no rainfall during the summer season in California. Thus, the bulk of my experience is in treatment and regulatory compliance of wastewater in effluent-dominated settings that do not benefit from dilution for compliance.

Receipt of my Ph.D. degree was soon followed by final adoption of the California Toxics Rule (CTR) (40 CFR Part 131) in April 2000, though it was widely anticipated in the environmental community for years prior. The CTR contained the most stringent regulatory criteria for dissolved toxic contaminants in the world. For example, drinking water standards are adopted with a consideration of cost, leading to a generalized cancer risk of 1 case per 100,000 people drinking the water over a lifetime. The criteria adopted by the CTR assumed a cancer risk of 1 case per 1,000,000 people drinking the water over a lifetime in addition to protecting aquatic life over time periods of 1 hour to 4-days. Thus, the numeric regulatory criteria described by the Safe Drinking Water Act are often an order of magnitude less stringent that the criteria described by the CTR owing to a more restrictive cancer risk assessment and aquatic life limitations where fish are continually exposed to contaminants through their respiratory process.

Available wastewater treatment processes at the time of my hire were designed to remove oxygen consuming contaminants (e.g., aeration) and particulates (e.g., clarification, filtration), not to remove toxic contaminants. It was assumed that toxic contaminants would pass through wastewater treatment facilities, so their removal would have to be via industrial source control. However, because the standards contained in the CTR were so stringent, the drinking water supply alone often rendered an effluent non-compliant with regards to CTR. The regulation of copper provides a particularly poignant example; copper is regulated by the Safe Drinking Water Act 1,000 micrograms per liter (µg/L) to protect human health. Typical copper criteria described by CTR is often less than 10 µg/L (hardness dependent) to protect fish. The source of copper in municipal wastewater is often the copper plumbing used within residential and commercial construction. Copper is not a contaminant that can be effectively reduced via source control because it is not industrial practices that are the source of copper. Copper is just one

example of many, and at the time of my beginning work as a consulting engineer there existed no textbook guidance for removing multiple priority pollutants simultaneously to the very low levels dictated by CTR. Thus, I spent a career developing compliance strategies and, in some cases, technologies for my clients specific to priority pollutant control.

I was responsible for developing treatment strategies for the reduction of toxic chemicals in both stormwater and wastewater. Regarding stormwater, I was hired by the California Department of Transportation (Caltrans) to develop a treatment process for the reduction of iron, phosphorous, and nitrogen simultaneously from high quality highway runoff that flowed into Lake Tahoe in an effort to maintain Lake Tahoe clarity (a response to lawsuit settlements by the environmental community). I directed and operated a dedicated research facility funded by Caltrans at the Meyers Maintenance Station located on the south shore of Lake Tahoe. That work lead to my being hired by Sacramento County to aid in the development of best management practices associated with county stormwater runoff.

Regarding wastewater, I designed the first fully compliant treatment plant under the CTR. That treatment plant was for the City of Lincoln, CA discharging into a very low hardness receiving water (i.e., regulatory criteria become more onerous as hardness is reduced). I researched and developed the maturation pond treatment process for priority pollutant control in response to industry needs. That treatment plant was able to lower previously problematic concentrations of silver, copper, aluminum, lead, perchlorate, pentachlorophenol, and dioxin simultaneously to compliant levels in a low hardness environment. This was a feat never previously reported in research literature or in textbooks and ultimately allowed for adoption of the first permit in the United States that allowed for irrigation of rice with recycled water. The success of this project, among others, led to my becoming a principal of ECO:LOGIC in 2002 and leading its growth from approximately 24 people at my time of hire to approximately 150 employees throughout California and Nevada at the time of its sale in 2012, primarily aiding small communities in becoming compliant with CTR criteria. My curriculum vitae is provided as Attachment A.

I began investigating the removal of pharmaceuticals and personal care products in wastewater as part of an indirect potable reuse project for the City of Reno, NV. That project consisted of researching and developing treatment processes specifically for the removal of these contaminants to allow for injection of recycled water into the underlying groundwater aquifer with subsequent extraction for beneficial reuse. The project led to the development of the biologically active activated carbon filtration process for control of pharmaceuticals and personal care products. The process was based on the application of a strong oxidant (i.e., ozone) to extended aeration activated sludge effluent to break complex molecules to simpler by-products and then developing a biofilm on activated carbon that would further break-down those by-products to inert forms. The process was able to remove most pharmaceuticals and personal care products to concentrations equivalent to the reverse osmosis/advanced oxidation process required for use in California for similar types of projects. This advance was important for the City of Reno because, unlike California, Nevada does not have an adjacent ocean that could potentially be used for brine waste disposal so generation of a brine waste would be considered a project failure. The process I led in its development actually removed toxicity rather than concentrating it into a smaller brine stream. The process was not perfect, however. I observed deficiencies that are relevant to the investigation associated with Mule Creek State Prison. I learned that it takes rather exotic treatment to remove pharmaceuticals and personal care products from wastewater. The type of treatment needed is not present in almost all wastewater treatment facilities. I also learned that some contaminants cannot be removed except via separation at the molecular level (e.g., flame retardants). Thus, the presence of pharmaceuticals and personal care products is a very good indicator of sewage contamination.

The compliance success of my process designs led the State of California to award me contracts through the University of California at Davis to teach Regional and State Board staff courses on:

- Disposal of Non-Designated Waste to Land; System Design, Operation, and Monitoring
- Introduction to Wastewater and Its Treatment
- Wastewater Engineering 2; The Advanced Class
- Wastewater Facility Inspection

My work on emerging contaminants was extended through my hire as a professional peer-reviewer for the ~$1 billion expansion of the Sacramento County Regional Wastewater Treatment Plant to accommodate future regulatory concerns regarding regulation of pharmaceuticals and personal care products in their discharge to the Sacramento River.

It is relevant that as a principal of the firm, I was also directly responsible for the oversight of collection system projects where the introduction of stormwater into wastewater collection systems is pertinent (e.g., reducing inflow/infiltration). The classes I taught for the State Board addressed inflow/infiltration and how to minimize or account for it in design. The entry of wastewater into a stormwater collection system (i.e., the mechanism hypothesized as occurring at Mule Creek State Prison by CSPA) is similar to Inflow/Infiltration (I/I) processes that are routinely observed with sanitary sewer systems elsewhere.

It is instructive to explain I/I. With I/I, water leaks out of holes, breaks, and separation of conveyance piping seams and moves through the compacted backfill matrix surrounding the pipe (see Figure 1). Clay soils like the type present at Mule Creek State Prison, are often assumed to prevent water movement through the soil. However, because the backfill material must be granular in nature to allow for sufficient compaction to prevent settlement, released water from pipes will flow through the granular backfill material. Once leaked water finds its way into the backfill material, it will find seams, pores, and fractures within the soil matrix to allow for its continued flow powered by gravity.

Figure 1
Example of a pipe being backfilled as part of pipe construction
Source: https://www.thespruce.com/sewer-pipe-types-1822511

If there exists a seam or passage way in the natural soil that connects the wastewater conveyance system with the stormwater conveyance system, infiltration into the stormwater system can result, especially in a clay soil environment because infiltration is slowed by the clay which can allow the backfill material to continue to fill with collected water. This phenomenon is illustrated in Figure 2.

An even more direct route of entry is via dewatering. For example, it is possible for leaked sewage to flow into underground vaults along with seasonal groundwater (e.g., electrical vaults). When groundwater enters these vaults, they are often dewatered to keep the vaults clear of water and protect the electrical system. Should dewatering occur, any water pumped from the vault will contain the mixture of sewage and groundwater. If the dewatering water is discharged into the stormwater collection system, as is done at the Mule Creek State Prison, then co-mingling of sewage with stormwater will result.

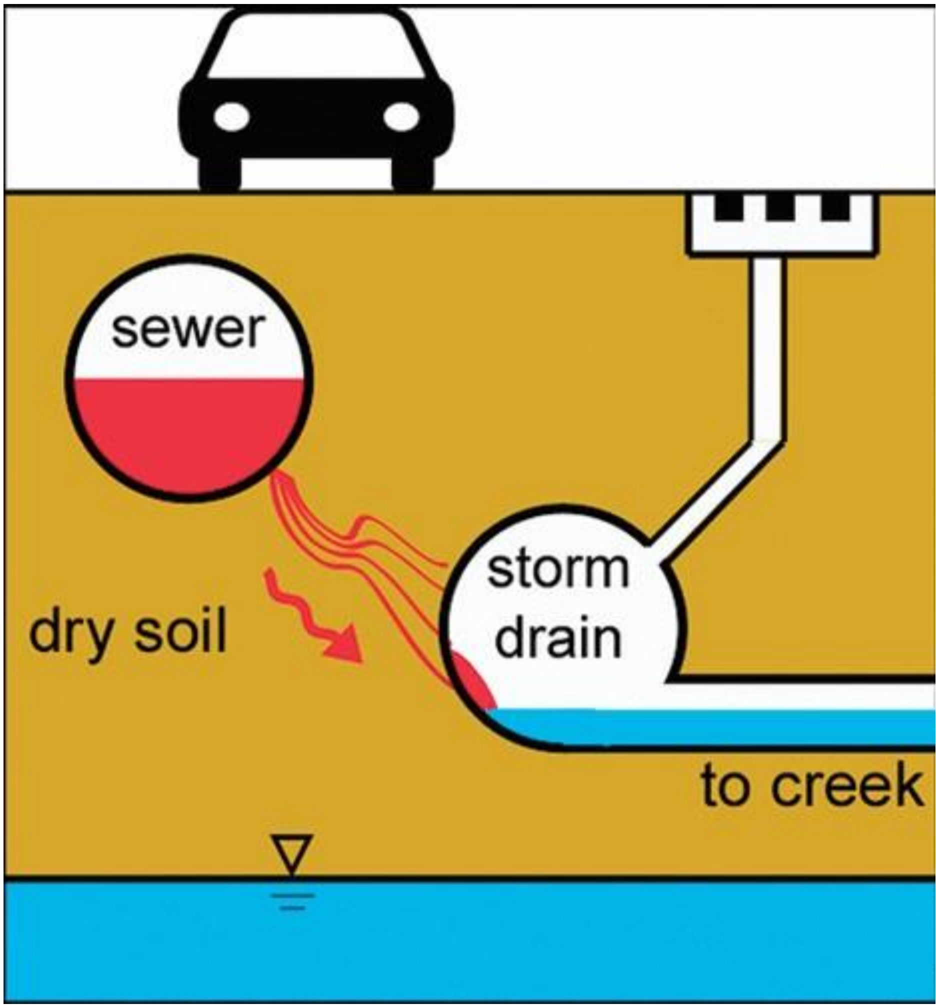

Figure 2
Schematic of sewer exfiltration entering a stormwater network
Source: B. Sercu et. al., (2011)

DOCUMENTS REVIEWED

The following documents were reviewed to provide background to the requested investigation:

- Weekly status reports (indicating non-storm water flows in storm water system)
- CDCR storm water sampling reports
- EPA R9 Inspection Report
- Regional Board 13267 and 13383 Orders
- Sample data from CSPA and CDCR
- Qualification of Sources of Fecal Pollution at Mule Creek
- Revised Stormwater Collection System Investigation Report of Findings
- Water Board letter report from Kenny Croyle to Kari Holmes (7 Dec 2020)
- NOAA rain data

The Revised Stormwater Collection System Investigation Report of Findings (SHN, 2019) and the subsequent letter report from the Water Board from Kenny Croyle to Kari Holmes dated 7 December 2020 states that the sanitary sewer system was constructed above the stormwater system in most areas of the prison and in some areas the pipes are buried very short distanced from each other, both vertically and horizontally. There are documented breaks in the lines.

Both Regional Board staff and Defendant acknowledge that indirect cross connections between the two systems are possible given their close proximity. However, Defendant seemingly arbitrarily concludes that the horizontal distances between the pipes is too great to allow for cross-connection via seepage from the wastewater collection and transmission piping network. However, smoke testing of the sanitary sewer system revealed 7 locations where smoke escaped through concrete seams in the ground, 2 locations where it escaped through grass in landscaped areas near buildings, and one location near a stormwater system manhole. It is reasonable to conclude that should smoke be able to move through the underlying soil, so can water. Regional Board staff stated that it appeared the smoke escaped from the sanitary sewer system, traveled subsurface to a location near the stormwater manhole, and then entered the manhole around the poorly sealed grade ring just below the manhole cover.

A United States Environmental Protection Agency letter report (Eric Magnan, 2021) states that the outfalls make use of slide gates that do not prevent discharge into the outfalls when closed. If wastewater entered the stormwater collection system, the slide gates would not prevent a discharge even if closed.

Defendant conducted study into whether any prison discharges could be impacting water quality within Mule Creek. The basis of the study was measuring DNA sequences specific to humans that would not occur with other animals like deer or birds. Defendant reported that there is not a consistent source of human contamination of the stormwater, but provided evidence that approximately 28 percent of samples contained evidence of a human impact. Regional Board staff attributed the positivity rate in part to an insufficient data set. They also attributed the low positivity to an insufficient number of different biomarkers and that the study might not reflect the common diet shared among all prisoners. Although both opinions are valid, I would add that exfiltration from any piping network is expected to be variable as many factors will influence the ability of one piping network to influence another. Examples include occurrence frequency and timing of discharges within the prison complex, seasonal groundwater levels, seasonal groundwater flow direction, the presence of saturated versus unsaturated flow within soils, amount of preceding rainfall, among other factors. The discharge of sewage does not need to be continuous to adversely impact beneficial uses of receiving waters, especially considering that aquatic life impacts occur over time frames of 1 hour to 4 days.

I proposed a course of study that best aligns with the Defendant study plan, but uses a more reliable indicator of human impact. If the water samples containing elevated concentrations of coliform contained human DNA, Defendant appeared prepared to recognize that the coliform observed were from human sources. In lieu of sampling DNA using non-approved regulatory methods, I instead proposed sampling for human derived chemicals that are not excreted by deer or birds (as blamed for elevated coliform concentrations by Defendant). If pharmaceuticals or personal care products were observed in stormwater originating from the Mule Creek Prison complex, it is reasonable to suggest that there is some contribution of sewage in the stormwater.

LITERATURE REVIEW

Central to the claim that Defendant discharges some contribution of wastewater through the stormwater network is whether it is possible for wastewater to leak from a wastewater collection system and flow subsurface and enter a stormwater piping network. Although regularly assumed possible, as was reported in the Revised Stormwater Collection System Investigation Report of Findings, Defendant claimed, albeit without substantiation, that the distances to be traveled were too great to allow the phenomena to occur. I specifically searched the research literature for examples where such phenomena were directly investigated. I found a study reported by the City of Santa Barbara in 2011 where movement of sewage from the wastewater collection system was directly observed moving into the stormwater collection system in their effort to investigate contamination of coastal beaches with fecal coliform. The City of Santa Barbara performed field experiments in three watersheds, both high and low risk of contamination. Rhodamine dye pulses were added to the sanitary sewers and monitored in nearby storm drain manholes using optical probes set up for unattended continuous monitoring. Above-background rhodamine dye concentrations were detected in storm drains in high-risk areas, and multiple locations of sewage contamination were found. Sewage contamination during field studies was confirmed using the human specific *Bacteroidales* HF183 and *Methanobrevibacter smithii* nifH DNA markers. The study was the first to provide direct evidence that leaking sanitary sewers can directly contaminate nearby leaking storm drains with untreated sewage during dry weather. That study suggests that chronic sanitary sewer leakage contributes to downstream fecal contamination of coastal beaches (B. Sercu *et. al*., 2011).

OPINIONS/BASES FOR OPINION

On March 9, 2022 and May 24, 2022, I inspected Mule Creek State Prison's stormwater collection network. Both days were sunny and warm with no rain[1] at least three days prior to March 9 and only a trace over the preceding month prior to May 24. Temperature was in the 80s (°F) on March 9 and was in excess of 90 (°F) on May 24.

Based on my observations during the site inspections of March 9th and May 24th, I understand Mule Creek State Prison to consist of inmate housing facilities and inmate-staffed industrial facilities. There are stormwater collection inlets and piping within the prison facility that lead to a perimeter stormwater collection network. The perimeter stormwater collection network receives stormwater from within the prison complex and from the roadway drainage that surrounds the prison facility. The perimeter stormwater network is not continuous. Various segments of the perimeter stormwater network combine into central concrete collection basins.

The concrete collection basins contain (A) pumps to facilitate discharge of collected stormwater into the sewerage piping network for subsequent discharge and treatment at the wastewater treatment facility, and (B) slide gates that, when opened, allow for discharge into a dirt lined drainage ditch that ultimately flows into Mule Creek. These are the same slide gates that EPA states do not prevent discharge into the outfalls when closed. I personally viewed the gates and agree on the assessment provided by EPA – in the event that stormwater flows exceed the volume capacity of the pumps, or if the pumps fail, and water spills into the chamber where the slide gates are located, water will discharge past the gates, whether opened or not.

[1] Based on my review of local rain data from publicly-available sources.

Due to the temperatures and preceding dry weather conditions, there should not have been stormwater in the stormwater conveyance system. During the March 9 inspection, I observed small amounts of flowing water at various locations within the stormwater system without identifying the source(s). During the May 24 inspection, I also observed small amounts of flowing water. Water was observed overflowing a sink in one of the industrial facilities and flowing over the asphalt into the stormwater system. Water was also observed flowing from an irrigated field that was being overwatered.

The prison's stormwater management plan specifies that all flow be routed to the sewerage system except during rainfall events of a particular size, whereby the slide gates are opened and stormwater is discharged to Mule Creek. There are three stormwater discharge outfalls from the perimeter collection system with two outfalls into Mule Creek. The locations of the outfalls, together with the sections of perimeter stormwater conveyance system feeding each outfall, are illustrated in Figure 3.

A photograph of one of the concrete collection basins feeding the outfall is presented in Figure 4. One of the dirt-lined ditches feeding into Mule Creek is presented in Figure 5.

I believe the most direct method to determine whether discharged stormwater contains a wastewater component would be to sample a stormwater discharge while occurring for pharmaceuticals and personal care products. Unfortunately, owing to the far-in-advance planning needed to protect security associated with operating a prison facility, it was not possible to plan visits to the facility during stormwater discharge events. Therefore, two site visits were conducted on days when stormwater discharges were not occurring. The intent with these site visits was (1) to gain a better understanding as to how the prison stormwater collection and discharge system is designed and operated; (2) to observe whether water is present within the stormwater network during dry periods when stormwater is not expected to be present; and, (3) to sample any water present within the stormwater collection network for contaminants of wastewater origin.

I, along with other representatives of both Plaintiffs and Defendants, visited the site in person on March 9, 2022 and May 24, 2022. On both occasions, samples were collected by both parties for off-site analysis. The site visits consisted of:

a. First inspecting the outfalls to determine whether discharges were occurring during dry weather periods;
b. Inspecting perimeter collection basins for standing or flowing water; and,
c. Sampling water present.

Although water was sampled and analyzed for a wide variety of contaminants (e.g., total suspended solids, salts, nitrogen species, etc.), the most critical contaminants sampled were for bacterial contamination (e.g., total coliform, fecal coliform, *E. coli*) and pharmaceuticals/personal care products. I witnessed the sampling and was satisfied that the samples collected were representative of the water present in the system at the dates and times investigated.

On the date I prepared this report, I had access to sample results from both parties pertaining to metals (e.g., iron, aluminum, copper, lead, zinc), arsenic, manganese, chemical oxygen demand, electrical conductivity, light transmittance at a wavelength of 254 nm, nitrate and nitrite, chloride, and bacterial indicators (e.g., fecal coliform, total coliform). The results reported by both parties were within the variability expected with the analyses. The results offered by both parties can be compared and are

deemed representative.

The basis for sampling for bacterial contamination is because those parameters are directly regulated by the stormwater discharge permit and directly impact beneficial uses of Mule Creek. Elevated concentrations of bacterial contaminants can lead to adverse health impacts associated with recreation in and around Mule Creek. However, although sewage contamination can cause elevated concentrations of bacterial contaminants, other factors such as environmental regrowth or natural deposition can also cause elevated concentrations so I prefer not to rely solely on these parameters to assess the likelihood of sewage contamination. To distinguish between human sources and natural sources, we also sampled for pharmaceuticals and personal care products. Both parties chose their own list of constituents to be assessed so there was little overlap between reported constituents present.

On March 9, 2022, I directly observed water in the stormwater collection system up to the final collection basin, which is shown in Figure 4. Due to the dry conditions, water was not expected to be observed in these basins. Figure 6 shows that the dirt-lined ditch leading to Mule Creek contained ponded water, with water present on the concrete apron and within the pipes connected to the final collection basin. Figure 7 shows ponded water throughout an extensive section of the discharge ditch, though I did not observe the water actually flowing into Mule Creek. I personally walked the surrounding fields in an effort to find sprinklers or other irrigation devices that could explain ponded water in the outfall ditch. No such irrigation devices were observed, but I did observe water in the stormwater piping network leading to the ditch. It was evident that there had been a recent discharge, though the discharge was no longer occurring at the time of the site visit.

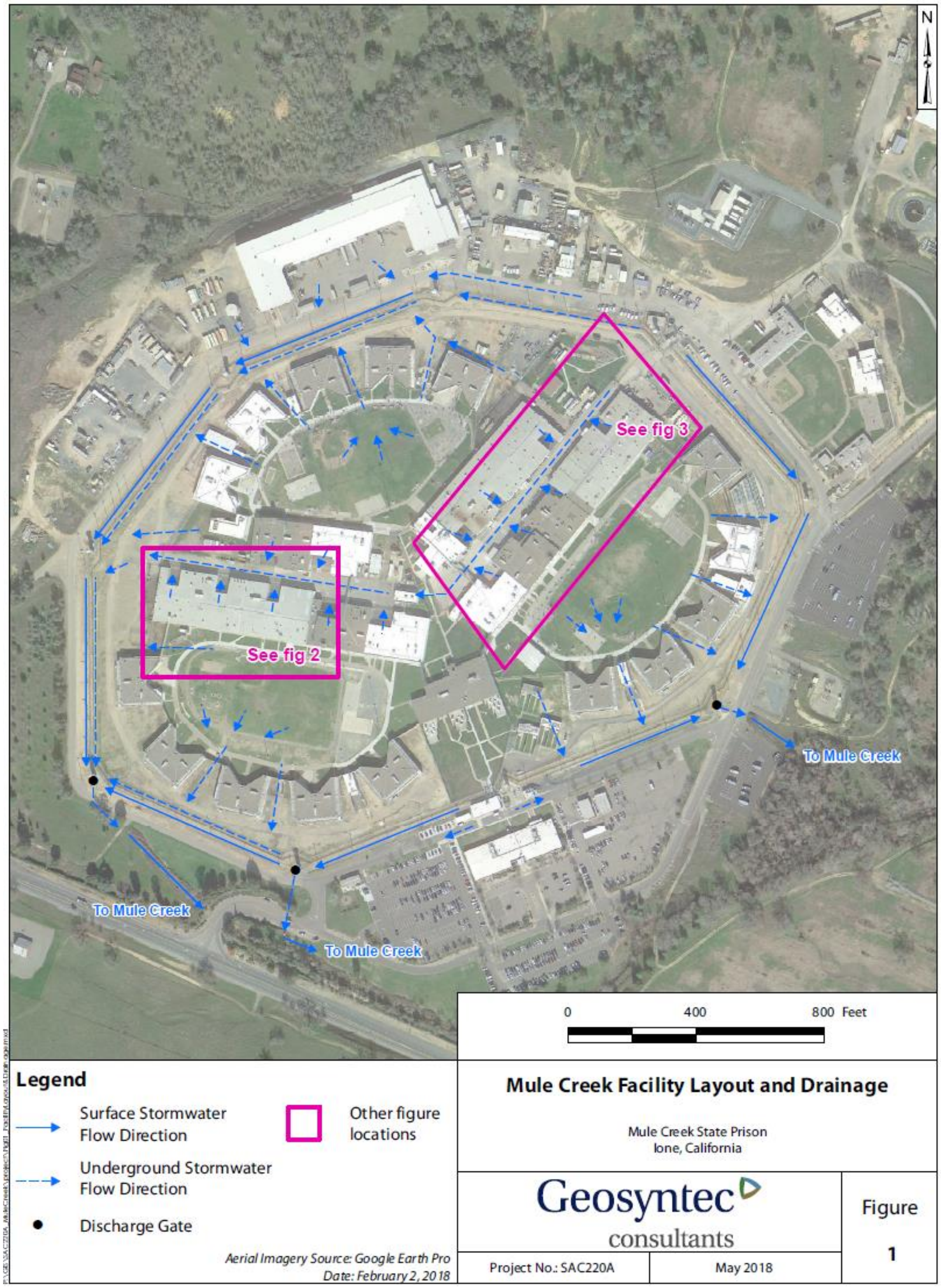

Figure 3
Mule Creek State Prison Stormwater Collection System Layout and Drainage

Figure 4
Concrete Collection Basin Containing Pumps for Diverting Flow to the Sewage System and Slide Gates Directing Flow to Mule Creek

Figure 5
Drainage Channel Used to Transport Stormwater to Mule Creek

FIGURE 6
Water Originating from the Concrete Collection Basin (Figure 4) and Flowing into Drainage Channel (Figure 5)

FIGURE 7
Unlined Ditch Outfall Showing Evidence of Flowing Water Toward Mule Creek

Samples were collected and analyzed at the two outfalls (i.e., the dirt lined ditches located after the concrete collection basins that ultimately flow into Mule Creek) and at various intermediate collection basins within the perimeter stormwater collection network. Figure 8 illustrates locations around the Mule Creek Prison Complex where sampling was conducted. Bacterial testing results are reported in Table 1 and pharmaceuticals observed present by each party are reported in Table 2.

All sampling locations on both testing days contained total coliform, fecal coliform, and *E. coli* (i.e., indicators of bacterial contamination). The concentrations observed at both outfall locations on March 9 are consistent with being contaminated with domestic sewage. The concentrations observed at the collection box locations on May 24 also indicated the likely presence of sewage contamination, though I did not see evidence of water flowing into the unlined channels leading to Mule Creek as was observed on the March 9 sampling day.

Both outfalls also contained pharmaceuticals when monitored on March 9. Specifically, samples we collected at both outfalls were observed to contain trace amounts of caffeine (i.e., a central nervous system stimulant found in coffee), carbamazepine (i.e., an anticonvulsant used to treat seizures, nerve pain, and bipolar disorder), dehydronifedipine (i.e., a drug metabolite), sulfamethoxazole (i.e., an antibiotic), thiabendazole (i.e., an antifungal and antiparasitic agent), and 1,7-dimethylxanthine (i.e., a metabolite of caffeine). Duplicate samples collected by the Defendant also found presence of Bisphenol A (a chemical used to make hard plastics), Naproxen (pain reliever), Acetaminophen (pain reliever), and TDCPP (polyurethane foam flame retardant).

Outfalls were not monitored on the second sampling date (May 24) because there was no water in the outfalls at that time. Intermediate collection basins were monitored because water was present in the stormwater collection network. Caffeine, carbamazepine, and thiabendazole were observed in all of the samples collected. Acetaminophen and 1,7-Dimethylxanthine were observed at 3 of 4 locations monitored, carbadox (an animal drug used in swine for production and therapeutic purposes) and sulfadiazine (an antibiotic) were observed at 2 of 4 locations monitored, and sulfamethoxazole was observed at a single location.

TABLE 1
Bacteriological Testing Results

	Sampling Date, Sampling Location[(a)], Responsible Party[(b)] and Detected Value (MPN/100mL)									
	March 9, 2022						May 24, 2022			
	1D1A10		2D1A10		3GT4		GT3	GT4	GT6	GT9
Contaminant	CSPA	CDCR	CSPA	CDCR	CSPA	CDCR	CSPA	CSPA	CSPA	CSPA
E. Coli	Present	>2420	Present	1120	Present	91	540	1600	240	130
Fecal Coliform	1600	>1600	540	1600	79	130	540	1600	240	130
Total Coliform	>1600	>1600	>1600	>1600	>1600	>1600	>1600	>1600	>1600	130

(a) Sampling Locations are illustrated on Figure 8
(b) Responsible party refers to the organization responsible for conducting the analysis.
CSPA = California Sportfishing Protection Alliance & Amador County
CDCR = California Department of Corrections (Mule Creek State Prison)

TABLE 2

Detected Pharmaceuticals and Personal Care Products in Sampled Waters

	Sampling Date, Sampling Location[(a)], Responsible Party[(b)] and Detected Value (ng/L)									
	March 9, 2022						May 24, 2022			
	1D1A10		2D1A10		3GT4		GT3	GT4	GT6	GT9
Contaminant	CSPA	CDCR	CSPA	CDCR	CSPA	CDCR	CSPA	CSPA	CSPA	CSPA
Acetaminophen	<14.1	6.2	620	680	<14.3	5	5.7		91	3.1
Caffeine	1630	1200	4240	3000	424	310	193	187	23000	53
Carbamazepine	1.9	ND	10.0	7.7			7.0	2.8	0.28	3.2
Carbadox									3.7	3.9
Dehydronifedipine	0.59		2.0				0.42			
Flumequine	2.6									
Sulfadiazine			7.6				1.1	1.2		
Sulfamethoxazole	1.2		7.4				9.8			
Thiabendazole	2.0		3.2		2.4		21	1.9	0.92	15
1,7-Dimethylxanthine	130		380				37	8.7	120	
Bisphenol A		60		90		19				
Naproxen		69		53						
DEET		16		17		22				
Ibuprofen		6.3		66						
TDCPP		160		110		58				
Cotinine				38						
TCPP				140		6.2				
Phenytoin		58				63				

(a) Sampling Locations are illustrated on Figure 8.
(b) Responsible party refers to the organization responsible for conducting the analysis.
CSPA = California Sportfishing Protection Alliance & Amador County
CDCR = California Department of Corrections (Mule Creek State Prison

FIGURE 8
Monitoring locations around the Mule Creek Prison Complex

CONCLUSIONS

Bacterial indicators (e.g., total coliform, fecal coliform, *E. coli*) were observed within the stormwater collection network at concentrations that exceed water quality objectives. In an effort to identify the source of bacterial contamination, sampling was conducted searching for pharmaceuticals and personal care products within the stormwater collection system. Pharmaceuticals and personal care products were observed within the outfalls and within collection basins at the Mule Creek Prison Facility.

The Mule Creek Prison Facility is the only source of water to the stormwater system. Thus, there are no other water sources that could contribute the observed contaminants to the stormwater collection system and wild animals are unable to contribute the types of contaminants observed.

The most likely source of these pollutants at the facility is from the sanitary sewer system. The system is reported as being in disrepair with smoke testing confirming both the presence of leaks and the ability of smoke to pass through the native soil and pipe backfill material. The sewage collection system is located in close proximity to, and in some places above, the stormwater sewer system. Most of the stormwater system that I observed contained at least trace amounts of water even during hot and dry periods where stormwater generation is not present. Water was actively flowing in the stormwater conveyance system along the western perimeter of the prison, with observed contributions from the center corridor from the east.

Lastly, it appears that there are discharges occurring that are outside the allowed periods described by the MS4 permit. Although I did not personally witness an active discharge into Mule Creek, I did witness water within the pipes feeding the outfall ditch with standing water inside the outfall ditch. Based on preceding weather conditions, there was no basis for that water to be present at those locations. It is

likely that water is being discharged to the stormwater piping network that is not entirely rainfall based (e.g., dewatering water, excess irrigation water, spills within the prison facility) and the presence of pharmaceuticals indicates that some of this water is contaminated with sewage. Depending on the amount of water being generated at any given time and discharged into the stormwater collection system, the collection box weir can easily be inundated and the slide gates are insufficient to prevent a discharge into the unlined ditches leading to Mule Creek.

Based on (1) the direct observation of standing and flowing water within the stormwater collection system during non-rain events following extended dry atmospheric periods, (2) the direct observation of water within the dirt-lined ditches leading to Mule Creek, (3) the measured observation of bacterial indicators at concentrations that exceed pertinent regulatory standards, (4) the measured observation of pharmaceuticals whose only source can be from human excrement, and (5) the measured observation of personal care products whose only source can be from humans, I can state with certainty that discharges occur through the stormwater piping network that contain a sewage component.

I swear under penalty of perjury under the laws of both California and the United States that the foregoing is true and correct and that this declaration was executed on August 1, 2022 at Aptos, California.

Sincerely,

Robert W. Emerick, Ph.D., P.E.

REFERENCES

Petrie B., Barden R., Kasprzyk-Hordern B. (2015) “A review on Emerging Contaminants in Wastewaters and the Environment: Current Knowledge, Understudied Areas and Recommendations for Future Monitoring”, Water Research, Vol 72, 3-27.

Ngoc Han Tran, Martin Reinhard, Eakalak Khan, Huiting Chen, Viet Tung Nguyen, Yiwen Li, Shin Giek Goh, Q.B. Nguyen, Nazanin Saeidi, Karina Yew-Hoong Gin (2019) Emerging contaminants in wastewater, stormwater runoff, and surface water: Application as chemical markers for diffuse sources, Science of The Total Environment, Volume 676,Pages 252-267

B. Sercu, L. Van De Werfhorst, J. Murray, and P. Holden (2011) Sewage Exfiltration As a Source of Storm Drain Contamination during Dry Weather in Urban Watersheds, Environmental Science and Technology, Vol 45, pp. 7151-7157.

EXHIBIT 30

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF CALIFORNIA
ROBERT T. MATSUI FEDERAL COURTHOUSE

---oOo---

CALIFORNIA SPORTSFISHING PROTECTION ALLIANCE, Plaintiff, vs. KATHLEEN ALLISON, in her official capacity as Secretary of the California Department of Corrections and Rehabilitation, Defendants.	No. 2:20-CV-02482-WBS-AC
COUNTY OF AMADOR, A PUBLIC AGENCY OF THE STATE OF CALIFORNIA, Plaintiff, vs. KATHLEEN ALLISON, in her official capacity as Secretary of the California Department of Corrections and Rehabilitation; PATRICK COVELLO in his official capacity of Warden of California Department of Corrections and Rehabilitation Mule Creek State Prison, Defendants.	No. 2:21-CV-0038-WBS-AC

DEPOSITION OF DR. ROBERT EMERICK
SAN FRANCISCO, CALIFORNIA
SEPTEMBER 30, 2022

REPORTED BY: OLIVIA M. RENDON, CSR 14306
JOB NO. 76840

Q. Okay. Do you recall which other experts' work you reviewed?

A. Well, there was a lot of regional board reports. And then I think that's even in this SHN report they talked about it.

Q. Any others that you can recall?

A. Right offhand, I don't recall anymore than that. There might have been more. There may have been monitoring reports. I just don't recall offhand.

Q. So with your waste water experience --

A. Hmm-hmm.

Q. -- obviously, E.coli is an indicator of sewage; isn't that right? Is that correct?

A. Hmm-hmm. And the regional board claims it's a better indicator than coliform that's why they start to use it in some areas.

Q. Okay. Do you also see elevated levels of ammonia in association with sewage?

A. In general, or in this particular case?

Q. In general.

A. When I looked at the -- any time you look at, hey, how much sewage is here, the first thing you do is look at ammonia. So yeah, ammonia is typically a very good indicator of getting sewage. Okay. The problem -- there's several problems with ammonia. It's not a

perfect indicator.

One is you have a detection limit. And so unless your -- you have a lot of sewage, you're actually diluting the sewage with storm water. And you can dilute the ammonia down below the detection limit of the ammonia test quicker than you can dilute out coliform or E.coli, because they occur in such high numbers. So that's one particular problem.

The other is when you have ammonia, and you go through a fixed film, then you can nitrify. And so you can get ammonia getting converted, and then you still have the nitrogen present. And then it's the process of denitrification that we would blow out all the nitrogen into the atmosphere. And if you don't have a lot of knowledge of the system, then you don't really know what you're getting, so then you look at nitrate. But it's one of those things where it's just -- it's not a reliable indicator, ammonia. If you solve the ammonia, then it's absolute guarantee. You got ammonia, then yeah, you got sewage in here. But if you don't have ammonia, it just means that you may have been diluted below the detection limit of the test. The storm water component versus sewage.

So I never stated anywhere that I thought that the sewage was 10 percent of the flow, for instance. I

think it's a very, very small fraction of the flow. But that's why I don't think ammonia is the -- is the tell-all.

Q. Okay. I think I understand.

A. But I did look for ammonia. The first time they gave me the data, they said, do you think sewages?

Any good engineer would first say, let's go look at the ammonia. That's standard practice.

Q. Okay. So you looked at the ammonia data?

A. Hmm-hmm.

Q. All right. And then if I understand correctly, you said something to the effect that ammonia gets diluted more than bacteria.

A. What happens is --

Q. Can explain that a bit?

A. Yeah. So coliform and sewage or E.coli, those things, they occur -- and, again, I didn't go to their waste water plants. I'm talking general numbers. Okay. Ten to the sixth -- you guys probably don't use ten to the six, huh?

Q. No. I use as little math as possible.

A. So ten to the sixth would be about 10 million. No. 1,000,000. 1,000,000 is ten to the sixth.

Q. That's what I was just about say -- I was going to impress you. I thought it was a million,

sorry.

A. No, no, no. You're right. So you typically have -- I'm trying to put numbers that are easier to not use exponents. A million to 10 million coliform per hundred mill. So in sewage, they occur at very, very high numbers. Ammonia typical numbers, 20 to 50 milligrams per liter, I'm guessing.

Q. For sewage you mean?

A. For sewage. If it's sewage coming right out of the plant -- into the plant.

Q. And what are the units? I'm sorry.

A. Milligrams per liter.

Q. Milligrams per liter. Got that.

A. So the detection limit on ammonia, I'm guessing is about -- I don't know this exactly, but I guess it's in the tenths of a milligram per liter, somewhere around .1, maybe. And with coliform it depends on how much dilutions you have to do. And this is something that I've been trying to explain to them for a very long time. Doing a coliform test, you kind of need to know what answer you're looking for, so you tell the lab how much you dilute down to, to make sure you get it. So you can see diluting from, say the ammonia was sitting there at 20 milligrams per liter, so one in ten would bring it down to two. One in a hundred

would bring it down to .2.

Well, now we're already near the detection limit of the test, just the one in a hundred dilution. And you're almost at the border of not even being able to detect ammonia anymore. Because you don't expect the ammonia in storm water. Whereas, coliform, if you're sitting there at ten to the sixth, you dilute it, now you're ten to the fifth for one in ten. Do it again, ten to the fourth. I mean, ten to the fourth, you can measure that very, very easily.

So that's where I'm getting at is, when you're diluting something down, your coliform are in such high numbers that, as you dilute them, they're still present. The ammonia tends to be in such low numbers, comparatively speaking, that you can dilute this out quicker to where you don't see them anymore while you still see this. Do that make sense?

Q. Yeah. That's a good explanation. I appreciate that. Okay. And then part of your response also referred to a nitrification process. Did I get the term correct? Can you explain what that means?

A. So ammonia, your NH3, NH4, depending on pH. So when you have oxygen and you have the correct bacteria, the nitrifying bacteria, you'll convert your ammonia, your NH3 or NH4, to NO3. Does that make sense?

And so if you have oxygen present -- and that's critical. You have to have oxygen to go from NH3 or NO3 -- and you have the correct bacteria, and the correct bacteria, as we were talking earlier, maybe I have to say it again. You can develop those. If you always have carbon source and you always have oxygen, then you will develop the bacteria to convert from ammonia to nitrate. Soil does that all the time. So then you would get ammonia converted to nitrate.

Well, then if you have -- you go into a non-oxygen environment, an anoxic environment, then you can blow the oxygen from nitrate to nitrogen gas, the N2, okay. And now you're removing nitrogen from the system. So when you get into -- so the types of scenarios that we're looking at where we've got, potentially, a leaking sewage pipe going through soil, well, you've got structure. Nitrifying bacteria like to live on structure. So they -- you can get them to -- like, if you looked at activated sledge, if you have a background in sewage --

(Reporter clarification.)

THE WITNESS: Activated sledge treatment process. And then you'd say, well, hey, here's a tank. There's nothing in the tank that we're nitrifying. Where's the structure? Well, the structure are other

bacteria. They develop flocks, that's the structure. The nitrifying bacteria adhere to those flocks. And now you can convert your ammonia to nitrate. You've got the process there. Well, you can do it in wetland systems. Any time you have a plant, as the sewage goes by a plant, that's the structure, the bacteria will grow on the plant. And then you have oxygen from the atmosphere, you can nitrify it. So then it's, well, did you see any -- the next question, if I were you, as an attorney, well, did you see nitrate then? If you're not seeing ammonia, that means you saw nitrate; right?

Well, once you go in anoxic, so if you're in a low-oxygen environment, like you would expect in the soils underneath the storm water system, you lose your oxygen. Now you've gone through the soil, you've nitrified. You still have a pretty long passageway to get to wherever that water is ultimately going to flow. Is it possible, then, if you don't have oxygen, which you wouldn't expect, to denitrify? And it goes off as nitrogen gas. It's possible. Did I measure it? No. But whether you're diluting out the ammonia, or you're nitrifying it/denitrifying it, it's immaterial. It's an unreliable indicator for sewage. There's too many things that could be going on from an ammonia perspective.

That's why I said, hey, let's go look at something where all of these compounding variables don't exist. That's kind of -- my whole approach is, there's a lot of compounding variables out there. Did you look at VOD? Did you look at COD? Did you look at TKN? You name a bunch of stuff and we can debate, did that come from an owl? Did it come from a rat? Did it come from a deer? My whole approach was, I don't to argue over where it likely came from, because I don't know. So let's look for chemicals that we know the source. So that was my only thought.

BY MR. MARSH:

Q. Okay. And I appreciate that testimony. So far you've mentioned a possible dilution of ammonia as a concern, and also the nitrification process, which sounded very complicated in terms of all the various factors; right? Are there any other concerns with regard to --

A. Ammonia?

Q. -- ammonia not being --

A. Why I didn't see it? Is that what you're saying? Why it didn't show up in high concentration?

Q. Exactly. Thank you.

A. No. I think that I wouldn't -- I don't think -- when you're looking at one-way stream

contaminating another waste stream -- in this case, sewage with storm water -- and you think of the mechanism that it would have to take to do that, I wouldn't have expected to see ammonia.

Q. Okay. And then I think my question was, other than --

A. Are there other things?

Q. Were those enough?

A. I think -- I mean, yeah. Offhand, I can't guarantee you I won't think of more later. But those are probably the big ones.

Q. Those are the primary concerns?

A. Yes.

Q. All right.

A. And the -- the -- no. The other concern is the characteristics of the waste water emanating from a prison. The reason I say that is, I studied UC Davis waste water for years. And UC Davis waste water, which was a student community, it was actually really, really low in coliform. Where I told you the norm is ten to the sixth to ten to the seventh per 100 mills. UC Davis waste water used to be ten to the fifth. I don't know why. It just was.

Because you can have other -- like, UC Davis, they have all the labs, they hose things down. They ran

on DNA, I would not attack them just because they used DNA. I don't have the expertise to attack them on DNA. Now, if they say, my DNA says there's no human source, and yet it's full of Acetaminophen and seizure drugs, I would say, I don't know if your method is sensitive enough to detect what I think needs to be detected.

BY MR. MARSH:

Q. Okay. I think I understand. And then you refer to the Environmental Protection Agency, also known as EPA.

Were you referring to the federal EPA?

A. Yes. I think permits are -- so -- so EPA has a jurisdiction for permits other than in California, which they've given that -- that authority to our regional board system. EPA typically doesn't get involved, except for approving methods or regulating triable, you know, things that are outside the norm. So when I'm talking about EPA, whether it's Cal EPA or Federal EPA, I'm not making a distinguish between the two.

Q. Okay. I appreciate that. So given your testimony today, loud and clear what's coming through is that you believe in the validity of using pharmaceutical sampling to do environmental tracking; is that right?

A. Yes.

Q. And you also --
A. **But you have to be careful on what you're trying to study.**
Q. And what do you mean by that?
A. **You know, I mean, I wouldn't -- you kind of have to like -- how do I say that?**
Q. Context is everything?
A. **Well, kind of, yeah. I mean, if you're talking about a storm water system and someone tells me, well, the source of water for this system is rainfall, hey, pharmaceuticals are great. If you turn around and say, hey, here's the Sacramento river, and we just sampled it, and we found a bunch of pharmaceuticals, does that mean that the prison or Sac Regional or someone else is at fault? I'd go, well, wait a minute here. There's a whole bunch of stuff upstream of the water shed. You know, you need to get more sensitive on if you're trying to produce the source. That's where I'm getting at. So if the source of storm water is rainwater, then yes, you would not have seizure drugs in rainwater.**
Now, in Mule Creek itself, if we were monitoring in Mule Creek and you said, hey, we found these pharmaceuticals. Are they from the prison? Remember when you were talking about the cow turds

earlier? Well, they might be giving cows antibiotics. So you have to be very careful about what you're trying to study.

Q. Okay. Is it also fair to say that you believe that sampling for caffeine is also a valid procedure for environmental source tracking?

A. Depending on what you want to monitor for.

Q. Okay.

A. So this goes back to, there are chemicals that you can give cattle, and they will show up. There are chemicals -- I mean, I don't know how often -- if -- like, women use various hormones for -- for various needs. And those hormones have been shown in the literature to cause male fish to turn female. So just because you see a pharmaceutical or personal care product, I wouldn't immediately jump and say the first thing upgrade is the source. Some of the these can travel very, very long distances. What I'm stating is, when you're doing storm water work and the source of water is rainwater, it shouldn't have those chemicals in it. So if you see those chemicals, they had to come from somewhere. Where else are they going to come from, other than the land by which the rain fell upon.

Q. Okay. And in talking strictly about pharmaceuticals, do I understand correctly -- because

you gave me some examples of sources of pharmaceuticals that did not come from humans; right?

A. Yes.

Q. So it's not accurate to say that the only source of pharmaceuticals could come from human excrements?

A. Actually, it's pretty funny. I -- one of these samples that we did was a -- if I remember, was an antibiotic used for pigs or something like that. And I was like, where the heck did that come from? So I asked them, hey, do they do any industrial practices at the prison that have to do with these meats?

Oh, yes, they do that.

Well, it didn't come from human. It came from -- used for the -- so that was probably industrial waste that got through. So it doesn't have to be humans. What's the practice where these chemicals were added on their site? Does that makes sense?

Q. Yeah, that makes sense to me.

A. I don't remember it offhand. I think I have it written in here. Is this the report that had all of the -- the report that had all of the chemicals I saw in it? I wrote it down, I'm sure. So, like, flame retardant, you wouldn't necessarily believe a flame retardant passed through your gut. You probably washed

your clothes, that's where the flame retardant came from. So just because you went to the bathroom, you probably didn't excrete a flame retardant. But if there's some way that there was any laundry that had been done, that could be laundry water. But laundry water is still sewage.

Q. Okay. But only speaking about pharmaceuticals.

A. So there's pharmaceuticals for humans -- oh, here it is. Carbadox, an animal drug used in swine for production and therapeutic purposes. I was like, wow, we found an animal drug in swine. And I was actually thinking your side, is this something that could cause this approach not to work? And they're like, oh, no. They have a facility there, a butchering facility or something. Okay. We just explained carbadox.

Q. Could you spell carbadox for the court reporter?

A. C-A-R-B-A-D-O-X.

Q. Okay. So going back to the original question, then. A pharmaceutical for humans, it's not fair to say that the only source can come from human excrement. There could be other sources?

A. Again, the context. If you say, here's rainwater, the rainwater is the only source, and it

passed through something in this facility, and we get Acetaminophen. No, there's no other source for Acetaminophen than passing through a human. If you say, we have this rainwater and it passed through, and you find out it was Carbadox, well, it didn't pass through a human. It passed a through swine. So everything is context because it makes -- so when you say, what's the other source for Acetaminophen? I cannot think of another source on a prison facility other than inmates. I mean, unless somebody is grinding it up and throwing it over the fence.

Q. Okay. I think you've answered my question. I appreciate that. As it applies to Mule Creek State Prison, what do you perceive as being the better method, pharmaceutical sampling or caffeine?

A. Caffeine is a subset of pharmaceuticals. It's a chemical that passes through us. Some people -- everyone says they take their coffee in the morning, otherwise they are a grouch the next day. They're using it as a pharmaceutical; right? They're treating their inability to wake up in the morning.

Q. Okay. So maybe I'll ask the question a different way. Caffeine versus non-caffeine pharmaceuticals, which do you view -- as applied to the Mule Creek State Prison, which do you view as being more

valid?
A. For showing what?
Q. For showing that -- good question. For showing that --
A. The reason I ask for what is they have a coffee roaster there. So you can get caffeine and never pass through a human because it went through a coffee roasting facility. It's an industrial storm water, it's not something that passed through a toilet. So are you saying, hey, what's the best indicator of something that you know passed through a human? I'd say let's look at naproxen, N-A-P-R-O-X-E-N, acetaminophen. There are things that are more likely to come through a human than come through a swine facility or a coffee roasting facility. Do you see what I'm saying?
Q. Yeah, I do.
A. So I'm looking at this from a -- several -- you've got to be very careful what you're looking a for.
Q. Yeah. And I appreciate you being careful with your answers --
A. And my understanding is CSPA isn't doing the industrial waste aspect. I think that's why the County is here. So if you're asking me County questions, I don't know what they're concerned about.
Q. Okay. And let me ask in a different way,

then. And you've appropriately reprimanded me for not asking a clear question. Between pharmaceutical sampling -- or between non-caffeine pharmaceutical sampling and caffeine, in your mind, which is more valid to determine whether sewage from the sanitary sewer system has made it way into the storm water conveyance system as applied to Mule Creek State Prison?

A. I personally like things like -- like I said, acetaminophen, naproxen, bisphenol A. No, bisphenol A is from hard plastics. That could actually be flow over other things. Antifungal, antiparasitic agents, things that are actually drug-related where you're treating something is probably a lot more -- it went through your gut. Things like caffeine could have gone through your gut, or they could have gone through an industrial process. Things like the one we just talked about, carbadox, I would think that would be a human thing. I would think that would be an industrial facility thing. But you know what? Maybe by eating the swine, you're releasing carbadox, too. I don't know. So I don't think it's, is one better than the other. They're just -- here's a line -- here's a variety of contaminates that if you said -- would you had changed your mind if you didn't see dehydronetopine in the water. Whether that specific one is present or not

present is immaterial. It's kind of, we've got this cocktail of chemicals that are coming out, that appear to someone that doesn't work in the prison industry is being something that I would expect to be in prison waste. It seems reasonable.

Q. Between caffeine and pharmaceuticals that aren't caffeine -- and I understand there's a variety and a full range of different pharmaceuticals -- which is most likely to break down an environment? It's okay if you don't know. I mean --

A. Well, I was sitting here try to remember, because caffeine came up in some of the these things. I can't remember if they liked it or didn't like it. It's not something I've had to be concerned about, so I don't know how long it takes caffeine to break down.

Q. Okay.

A. But we're looking at something that passes relatively quickly through the system. You know, frankly, if we had never found caffeine, but we only found the other ones, I would have come to the same conclusion. It'd be interesting -- I mean, if you turn around and said, hey, Bob, did you know that acetaminophen is banned by law from being used in a prison? And yet we found it.

Okay. You got me. So if you can tell me that

some of these chemicals shouldn't be in prison waste, that would be pretty strong. But the prison doesn't tell me those things.

Q. Sure.

A. They've got pretty strong security measures. We had very limited ability to investigate anything, to tell you the truth.

Q. Okay. And what's your -- what's -- can you describe for me the scope of your knowledge about caffeine in the environment, generally, and how it can make its way into a storm water conveyance system?

A. How can caffeine make its way?

Q. Yeah.

A. Like all the possible -- I guess I don't really -- to me it's either -- it's one of those things I'm not exactly sure the question you're asking. It seems to me like --

Q. Okay. Well, I think you've opined that the presence of caffeine in the storm water conveyance system indication to you --

A. Among other contaminates, yes.

Q. Fair enough. But let's focus on caffeine, if we can, for now.

-- indicates to you that there's a sewage component; is that right?

A. Yes.
Q. Okay. Are there other sources of -- possible sources of caffeine in the storm water conveyance system such as inmates dumping their coffee on the prison grounds? Is that a potential?
MR. PACKARD: Objection. Incomplete hypothetical.
THE WITNESS: If prisoners dumped their coffee on the ground and then there was a rain event that washed it into the sewer or the storm drain system, then yes, I would expect to see caffeine in that water.
BY MR. MARSH:
Q. Some level of caffeine in the water?
A. Yes.
Q. Okay.
A. And that's why I -- and if you said, well, what happens if, in the industrial facility -- I point to him. I think you work with the industrial people; right? If you said, what if they left some coffee -- ground coffee beans on the ground? Would that -- and they have wash water. I mean, on our second visit, I don't know if you're aware of this or not, but we saw water pouring out of a door and into a storm drain. And we were kind of going, what's going on there? And we walked up there, and sure enough, here's a sink, and

they filled up -- they turned the faucet on and it filled up, poured over. It was pouring over the ground and into the storm drain. And it was like, why are you dumping water -- and had there been coffee grounds there, then yeah, you would have expected to see some caffeine.

So I don't know. I'm not -- so I guess where I'm at is -- is because we're seeing such a variety of these things, bipolar drugs, seizure drugs, caffeine, pain medicine. But we're also seeing flame retardants. And as I stated, most people don't go chewing on their clothes. So that flame retardant probably came from washing scenario, you know, you know, something that -- but, you know, we found we find flame retardants in sewage all the time. But that's because we have laundry, a lot of squatters gets into the sewage.

Q. There's many possible sources?

A. Yeah. So I guess I'm saying it's not just -- one of these isn't the one that's made me think, hey, this is it. It was more like, wow, look at all these things.

Q. Okay. And I don't even know what -- you've got an amazingly impressive amount of knowledge in education. So I don't even know what I'm about to ask makes any sense in terms of your field of study.

But does coffee change in the body, so it'll look different than, say, once it gets into the environment as opposed to in its raw form?

A. I personally don't know the answer to that.

Q. And then similar to the question that I asked before --

A. I'll tell you, it was -- it shocked me when I was learning about this, that humans do not use medicines up in their entirety. That every single time you use a drug, a very large fraction of it goes down the toilet.

Q. Makes sense to me.

A. It's like fertilizer. When you irrigate land, you have to put your nitrogen, your phosphorus down. The regional board says do it at agronomic rates. The plants can't -- aren't a hundred percent efficient. They let some of the fertilizer go past. And most people don't understand that living organisms are not a hundred percent efficient in using up the things that they use.

Q. Makes sense to me. Okay. Let's go back to talking about pharmaceuticals. Sounds like you've got a pretty firm belief that the presence of pharmaceuticals in the storm water system indicates at least a sewage component. You're not going to opine on what levels,

which is fair, I think. And part of your analysis, if I understand correctly, is that the types of pharmaceuticals that were detected suring your two sampling events, it seems to me, are what you would expect in prison inmates; is that fair to say?

A. That the samples -- that the chemicals that were monitored for would be expected to come from the prison inmate? Is that what you're saying?

Q. Yeah. And maybe I'm not understanding your expert report. But it seems to me that part of your argument is that prison inmates probably use different pharmaceuticals than the general public.

A. No. They might -- they use whatever pharmaceuticals the prison allows them to use. So whereas -- I mean, I'm sure that there's some, like, MRI agents, okay? I don't know if they have an MRI at a prison. So you might see that in a community that has a hospital, but you may not see it at a prison if they don't have an MRI on-site.

Does that makes sense?

Q. Yeah. That makes sense to me. All right. And then similar to the question I asked about coffee and caffeine, the presence of pharmaceuticals in the sampling that you conducted suring your two site inspections, if inmates had thrown their pills onto the

prison grounds, refused to take them, whatever their purposes are, could that also explain the sampling results that you saw?

MR. PACKARD: Objection. Speculative and incomplete hypothetical. You may answer the question.

THE WITNESS: I am not familiar with prison etiquette. I don't know if guards check their mouths before they allow them into the yards. I don't know how prisons work. But if there is a drug that's dropped on the ground, then yes, it could show up in storm water.

BY MR. MARSH:

Q. And it would show up in the storm water sampling that you conducted; right?

A. Well, the part -- so here's the part that disturbs me. And I guess it doesn't disturb you. But the part that bothers me is, we went on sunny day, and there shouldn't be any water in the storm water system. Yet we saw flowing water in numerous locations. Some of it was big flows, and that was like when we saw the sink overflowing, or we saw the field being irrigated overflowing. Those were large flows. But we also saw these little, small trickle flows. And yet it's not raining, and it hadn't been raining. The -- it's kind of like when you say, hey, you know, would you expect it to -- if it was on the ground and would you wash it out,

I didn't expect to see water.

Q. Okay.

A. So it's kind of like, why is the water there? I mean, the water was more disturbing than the pharmaceuticals.

Q. Okay. I understand. But only looking at it from the prospective of the sampling results based on your two inspections, if there had been pharmaceuticals pills, deposited on the prison grounds, that's also potential source; is that fair to say?

MR. PACKARD: Same objection.

THE WITNESS: I'm sorry. Am I allowed to answer?

MR. PACKARD: Yes, you are.

THE WITNESS: Yes. If pills were dropped on the ground and they got washed off with the storm water, we would expect to see them where we monitored.

BY MR. MARSH:

Q. Okay. Appreciate that.

A. Now, you've got a lot of pills on -- you've got a large wide variety of pills being dropped on the ground.

Q. You're entitled to your opinion and are well compensated for it. Going back to our decision about ponded water, I think you would agree that E.coli can